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Railway Mechanical Engineer

September 1946

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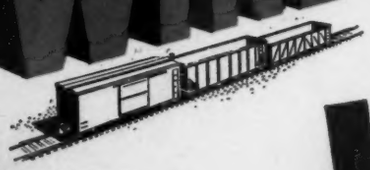

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Founded in 1832 as the American Rail-Road Journal

SEPTEMBER, 1946

Volume 120 *No. 9*

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Published on the second day of each month by

Simmons-Boardman Publishing Corporation

1309 Noble street, Philadelphia, Pa. Editorial and Executive Offices: 30 Church street, New York 7, and 105 West Adams street, Chicago 3. Branch offices: Terminal Tower, Cleveland 13; 1081 National Press bldg., Washington 4, D. C.; 1038 Henry bldg., Seattle 1, Wash.; 300 Montgomery street, Room 805-806, San Francisco 4, Calif.; 560 W. Sixth street, Los Angeles 14, Calif.; 2909 Maple Avenue, Dallas 4, Tex.

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The Railway Mechanical Engineer is a member of the Associated Business Papers (A. B. P.) and the Audit Bureau of Circulations (A. B. C.) and is indexed by the Industrial Arts Index and also by the Engineering Index Service. PRINTED IN U. S. A.

Subscriptions, payable in advance and postage free, United States, U. S. possessions and Canada; 1 year, $3; 2 years, $5. Foreign countries: 1 year, $4; 2 years, $7. Single copies, 35 cents. Address H. E. McCandless, circulation manager, 30 Church street, New York 7.

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BYERS STAYBOLT IRON

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Nine new 2-8-2's like this one recently rolled out of the shops of The Baldwin Locomotive Works, bound for service in Brazil. This new motive power used a time-tried means of protecting availability and avoiding excessive maintenance. Wrought iron staybolts were installed. The bolts were made from Byers Staybolt Iron.

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Meetings of Coordinated Associations

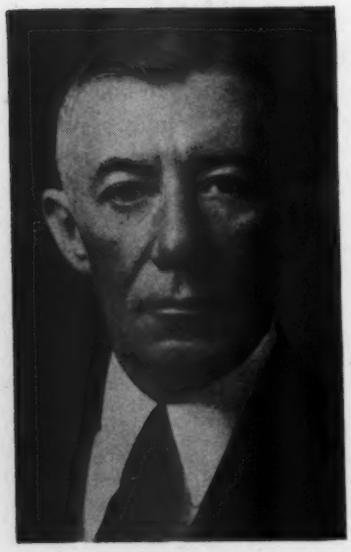
As THIS issue reaches its readers, the four coordinated associations of mechanical supervisors will be in session at the Hotel Sherman, Chicago. For the first time since 1941 these organizations—the Railway Fuel and Traveling Engineers' Association, the Master Boiler Makers' Association, the Car Department Officers' Association, and the Locomotive Maintenance Officers' Association—are holding full-fledged annual meetings associated with an exhibit by the Allied Railway Supply Association.

Deprived of the privilege of holding their annual meetings by the intervention of the war, these organizations have shown a morale during five years of curtailed activity of which every railway officer should be proud. These associations, being entirely voluntary, imposed no official obligations upon their members to keep up the work of their committees. But because of the sense of loyalty of their members to the railways as well as to the organizations in which many of them take a deep personal interest, the committees of all four of the associations maintained continuous activity from year to year with reports which have been of value to all of the members in meeting the heavy responsibilities related to the wartime load. A further result of this persistent maintenance of activity under handicap is the fact that these associations have come through the war into a period when normal activities are being fully resumed with unimpaired morale. This means much to their future service to the railways.

After a lapse of five years, the exhibit which will fully occupy the space available at the Hotel Sherman will be of unusual interest. Of course, during the war years direct developments in railway tools and equipment have been curtailed. On the other hand, some developments have been pushed forward by the effort put forth to meet special war needs so that, on the whole, this period has not been a complete loss by any means. Indeed, this will be evident from the descriptions of new tools and items of shop equipment which are described elsewhere in this issue.

Mechanical Division Resumes Its Annual Meeting

J. M. Nicholson,
Acting Vice-Chairman



R. G. Henley,
Chairman

V. R. Hawthorne,
Executive Vice-Chairman

Reports evidence progress despite five years since last full-membership meeting—Division's program of war activities is reviewed by General Committee

THE annual meeting of the Mechanical Division, Association of American Railroads, was held at the Hotel Sherman, Chicago, on August 8 and 9. This is the first regular meeting of the Division, attended by the membership at large, held since 1941. During the five intervening years there has been no interruption in the work of many of the standing committees, although committee meetings have been somewhat curtailed. Indeed, the Association, through its committees and through special research projects, played an important part in the prosecution of the war by finding substitute materials and other methods of reducing the consumption of a number of critical materials. These projects are presented in retrospect in the review or the work of the Association, and of its own actions in carrying on the business of the Association during this critical period in the nation's history, in the report of the General Committee.

Election of Officers

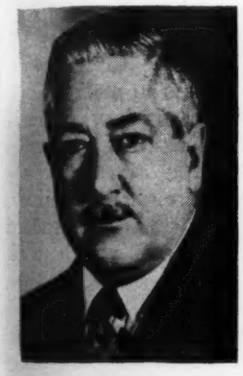
The following officers were elected to serve until June, 1948: Chairman, J. M. Nicholson, assistant to vice-president, Atchison, Topeka & Santa Fe; vice-chairman, A. K. Galloway, general superintendent motive power and equipment, Baltimore & Ohio.

The following were elected as members of the General Committee to serve a term of one year: H. B. Bowen,

A. K. Galloway

A. C. Browning, Secretary

B. M. Brown



H. B. Bowen, O. B. E.

A.A.R.
Mechanical Division

Officers

R. G. Henley, *Chairman*
J. M. Nicholson, *Vice-Chairman*
V. R. Hawthorne, *Executive Vice-Chairman*
A. C. Browning, *Secretary*

General Committee

R. G. Henley (*chairman*), *general superintendent motive power, Norfolk & Western.*

H. T. Cover (*vice-chairman*), *chief motive power, Pennsylvania System.*

F. K. Mitchell, *general superintendent motive power and rolling stock, New York Central System.*

O. A. Garber, *chief mechanical officer, Missouri Pacific.*

J. M. Nicholson, *assistant to vice-president, Atchinson, Topeka & Santa Fe.*

A. G. Kann, *general superintendent equipment, Illinois Central System.*

H. B. Bowen, *chief motive power and rolling stock, Canadian Pacific.*

J. E. Goodwin, *chief mechanical officer, Chicago & North Western.*

B. M. Brown, *general superintendent motive power, Southern Pacific Company.*

John Gogerty, *general superintendent motive power and machinery, Union Pacific System.*

A. K. Galloway, *general superintendent motive power and equipment, Baltimore & Ohio System.*

C. B. Hitch, *chief mechanical officer, Chesapeake & Ohio.*

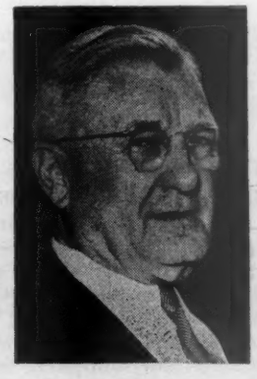
F. K. Mitchell

C. B. Hitch

H. T. Cover

J. E. Goodwin

J. Gogerty



O. A. Garber

A. G. Kann

O. B. E., chief of motive power and rolling stock, Canadian Pacific; B. M. Brown, general superintendent motive power, Southern Pacific; J. Gogerty, general superintendent motive power and machinery, Union Pacific; J. E. Goodwin, chief mechanical officer, Chicago & North Western; A. G. Kann, general superintendent of equipment, Illinois Central System; F. K. Mitchell, general superintendent motive power and rolling stock, New York Central System.

The following were elected to serve as members of the General Committee for a term of two years: H. T. Cover, chief of motivepower, Pennsylvania System; O. A. Garber, chief mechanical officer, Missouri Pacific Lines; R. G. Henley, general superintendent motive power, Norfolk & Western; C. B. Hitch, chief mechanical officer, Chesapeake & Ohio.

The election this year covered the entire membership of the General Committee because, as was pointed out in the report of the Nominating Committee, the terms of all members of the General Committee had expired since the last election at a full-membership meeting. Because of the provision in the Rules of Order of the Division that one half of the General Committee is to be elected each year, the Nominating Committee proposed the two terms of different duration.

The Nominating Committee also called attention to changes in membership and officers of the General Committee which have taken place during the past year. Vacancies were created by the deaths of H. W. Jones, chief of motive power, Pennsylvania System, and Walter H. Flynn, general superintendent motive power and rolling stock, New York Central System. To succeed Messrs. Jones and Flynn as members of the Committee, the General Committee elected H. T. Cover, successor to Mr. Jones as chief of motive power, Pennsylvania System, and F. K. Mitchell, who succeeded Mr. Flynn as general superintendent motive power and rolling stock, New York Central System. These elections were for terms expiring with the Division's 1946 annual meeting. At the time of his death Mr. Jones was serving as vice-chairman. To succeed him until the 1946 annual meeting the General Committee elected J. M. Nicholson acting vice-chairman.

The meeting of the Division was opened with three addresses, the first by L. L. White, vice-president, Chicago & North Western, who discussed the problems of training future officers; the second by the Hon. W. J. Patterson, member, Interstate Commerce Commission, who dealt with the need of improvements in maintenance affecting safety, and by Clark Hungerford, vice-president, Operations and Maintenance Department, A. A. R., who deal with the problems facing the railroads, particularly those providing an adequate freight-car supply. These addresses and the committee reports are abstracted below with summaries of the discussions which took place at the meeting.

The Training of Prospective Officers

By L. L. White

Vice-President, Chicago & North Western

"Employee relations," "employee training," "job methods," "job relations"—terms which were once foreign to our vocabulary—have in recent years, and particularly under the impetus of war-time demands upon practically every person in the nation, taken on a new meaning, with tremendously important and far-reaching significance. Indeed, employee relations and employee training have evolved into a highly developed science, and presently there are a number of institutions and organizations which are devoting all of their talents and energies to the furtherance of this activity.

If the railroads are to keep pace with the other branches of industry, and with the rapidly and ever-changing times, it behooves railroad management, wherever it has not already done so, to inaugurate a sound and systematic program for training employees. The immediacy of the need is, I think, readily apparent; and let us not for one moment forget that the actions we take or fail to take today will play a major role in deciding the issues of tomorrow.

It is, indeed, to the credit of mechanical-department personnel, and particularly to the leaders of that segment of the railroad family, that they have made greater strides in the realm of planned training than have the other major departments.

Promotion Material Changed

The *need* for training men for official positions has always been with us, but unfortunately we have been rather slow to recognize it as such. Our slackness in this regard, I think, has been due to several reasons, chief of which is the fact that for many years railroading was generally regarded as a preferred occupation. Frequently it was necessary to have connections or "pull" to secure a place on the waiting list for a job, and many of the most ambitious young men in our communities chose railroading for a career because it offered the most attractive opportunities. Production of reasonably capable officials was more or less automatic, and required less planning, supervision, and encouragement than are now needed.

That situation does not obtain today. In the first place, we do not presently offer as attractive a proposition to prospective employees as do certain other industries. In the second place, we are considerably restrained in selecting the best candidates for promotion because seniority has established priority as the principal requirement for advancement and job selection. Union organization of supervision has made it even more difficult for ambitious individuals to prepare themselves for promotion. Under these circumstances we have little alternative but to take the available timber and improve on it, not over a protracted period of time, but as quickly as possible.

Even the improvements and new equipment which war-time activities demanded and expanded earnings permitted us to purchase may not prevent a recurrence of financial difficulties. As you undoubtedly are aware, we have not yet been able to secure adjustment of rates to compensate for increases in the cost of doing business. In addition to our recent loss of revenues, we must face the fact that we are again competing with other modes of transportation which, unfortunately, at the expense and to the detriment of railroads, are still being encouraged and assisted by means of subsidies by the federal government under the pretext of national defense, or for political reasons. The proposed St. Lawrence River waterway and the appropriation of public funds to build airports for use by commercial air lines are but two examples of what I have reference to.

Not only do we face the risks inherent in normal, healthy, progress-stimulating competition, but we must also bear the government-imposed yoke of discrimination in favor of rival agencies of transportation. For that reason, if for no other, the best leadership will not be too good.

We have but scratched the surface so far as the potentials of employee training are concerned. Indeed, I think we have done

a rather poor job in acquainting both employees and the public on railroad problems. A recent poll of railroad employees indicates that the average railroader has slight conception of vital railroad facts and problems. If he who is a member of the family is so woefully uninformed, what can we expect of the public?

Where will we find our prospective official? It is most likely that under present conditions he is already an employee, having entered railroad service of his own accord. He probably likes his job, but is poorly informed on railroad problems. When he was hired he should have been, but probably was not, thoroughly instructed in the policies of the company, the relation of his job to overall operation, and the prospects and methods of advancement. The importance of this phase of primary training during the first few days or weeks of the employee's association with management cannot be over-stressed, because any and all supervisors are considered "management" by those whom they supervise. The labor organizations lose no time in seeing that the new employee becomes familiar with their version of his rights and prerogatives, but I wonder how often management has failed to instruct him in his duties, his obligations and his opportunities.

Map of the Training Program

After the indoctrination of the new employee, and after the preliminary work that has been done to adjust him to his new surroundings, he must be taught to become proficient in the particular trade or profession in which he is employed. This cannot be done by any centralized or standardized training method, for a number of reasons. Standardization is impractical because of the variety of trades, skills and accomplishments which are required of the people who run a railroad. It is also impractical because railroad properties are extensive and the employees are spread out over large areas instead of being concentrated as in the case with industries in general.

It is, therefore, evident that a railroad training program must follow the line of railroad organization, with the contact and direction of effort stemming from the officer in charge to his immediate subordinates—they in turn branching out to those whom they supervise, and so on down the line to the man in the field. The major problem is to devise means of getting the information which we wish implanted among our employees thoroughly distributed and completely understood.

I liken this method of dissemination of knowledge and instruction to the chain letters which were popular some years ago—when at the postman's knock we had visions of being deluged with nickels, dimes and dollars contributed by those who were equally desirous of getting something for nothing—in that if any person along the line failed to send in his dime, dollar, stamp, or whatever it was, the chain was broken. That is what happens in training programs, which makes it absolutely necessary that spot checks be made by the proper supervisory persons at regular intervals to see that there has been no break in the chain.

It is, indeed, most unfortunate when the transmission line becomes broken or fouled. What happens is that the younger men, that is, the newer employees from whom our future supervision may be derived, will be the ones who will most likely miss the things we want them to get, just at the time when they are most susceptible to training. I believe firmly in the value of lessons which are learned by doing the job, but it is also highly important that supervision and encouragement be provided generously, not only when a man is starting a new job, but for some time while he is working at it. The training of prospective officials is something that I, for one, like to think of as starting the day the new employee enters service. That is why I have emphasized the new employee and the problems connected with his training.

Provide for Broad Experience

Assuming that we still have control over some of the subordinate supervisory jobs so far as assignments are concerned, it is desirable that younger men of ability be transferred from job to job in order that they may master as much of the various aspects of railroading as they can. Where this is accomplished on a large scale, a supply of well-trained potential supervisors and officials will be our reward.

A rather perplexing situation sometimes develops when a supervisor whom we have been grooming and preparing for further promotion, when offered the promotion, declines to accept it. His refusal may stem from lack of confidence in himself or his management, or other reasons, but when this happens it shoots our best made plans full of holes. It indicates, among other things, that somewhere along the line we failed to condition that employee or supervisor properly.

We should do everything possible to attract college-trained men to railroading. We must have the benefit of their special training in the new developments of science. I am delighted to observe that the Mechanical Division is again offering its special scholarship at Stevens Institute of Technology to sons of members of the Division.

To develop an all-round mechanical man requires that he should have had as much practical experience as possible with varied situations. He should be assigned to a number of shops, roundhouses, repair tracks and transportation yards, on day and night shifts, and in large and small terminals. This requires him to move rather frequently, and to accept assignments which may not always appeal to his family or himself. Encouragement and the prospect of further advancement are essential in such instances.

Similarly, it is of great value to any man who aspires to be an official that he have an opportunity to work in more than one department. It is the obligation of railroad management to see that these opportunities are provided.

Selection of Candidates

I urge that former hit-or-miss methods of selecting men for advancement be superseded by precision methods, which might well be described as the processes of elimination. This does not require a trial performance, but necessitates a canvass of the available manpower and a rating, based on age, ability, personality, integrity, interests, ambition, etc. This rating may or may not require written records. I suggest it is preferable that there be no written record, and certainly no publicity should be given such information.

I have had department heads tell me that they had no one to promote to fill vacancies, and when I prompted their use of the process of elimination, they were able satisfactorily to fill the job within their own department. Waiting until the last minute, of course, is neither desirable nor safe. To be effective, the rating I have in mind is a running affair that is being constantly studied and brought up to date. What we are mainly trying to develop is leadership, which resolves itself into two parts: (1) the ability to get along with people, and (2) the art of instructing others.

It is unfortunate, but true, that not all supervisors are leaders. Those who are not must have more assistance and guidance than others. Intradepartmental transfers may or may not be helpful in bringing out this quality. If a man cannot handle more than his present responsibilities, it would be unwise to crowd him into a bigger job. It is also unfortunate, but likewise true, that not all supervisors are good instructors. It is to overcome these deficiencies that we must carefully plan our training program to bring out the best in what we have and develop sources for prospective officials of all types.

Program-Building Sources

The War Manpower Commission during the war sponsored a Personnel Committee which developed a program of training that can be very well modified to suit our present needs. This program should be sponsored by the executive officers of the railroads; its details should be developed and put into practice and followed up by an employee-training specialist who should be attached to the executive or personnel office. The usual methods of contact may be employed, such as local, divisional, or system staff meetings; by the distribution of circular letters and courses of study; and by the use of moving pictures and slides that are sound-tracked.

We have a fine means of contacting our men on railroads through division and system officers who are regularly on the road. They can determine whether the local people are sufficiently interested in the program, and where they are not, the traveling officers are at least in the best position to undertake to arouse that interest. Not the least important part of the program is the necessity for keeping the men informed of our aims. If we fail in that, it is no wonder that we do not succeed.

There are certain fundamentals which are necessary to success in undertaking of the type of employee training described. Good railroad officers are not born, and only rarely do they float into our laps through mere chance. An acknowledgment of these facts, coupled with a true evaluation of past accomplishments and failures, as well as present objectives constitutes the logical

foundation for the next requisite, which is the formulation of a sound policy and a systematic method of training employees. The third step, of course, is a constant check to determine that the program is functioning efficiently and serving the purposes intended.

Above all, it is absolutely essential that the program be sparked by the head of the department. I don't care what the movement is, whether it be employee training, safety first, perfect shipping month, Community Fund Campaign, or what have you, unless it has the genuine, wholehearted, and unstinting support of the department head, it is doomed to failure from the outset.

Significance of Leadership

When we train men to be leaders in industry, that leadership is not restricted to their eight, nine, ten, or more hours on the job. Leadership is not something we don when we take up our task in the morning, and then placed in the desk, the file cabinet, or roundhouse, or storeroom when quitting time comes around. It is constant, and the same leadership that we develop primarily for on-the-job purposes finds equal expression by those whom we train in their home communities, their fraternal organizations, the Mechanical Division, and in local, state, or national civic and political affairs.

There are those in our country, yea, in the very halls of government and in the seats of authority, who are seeking by every device to pervert the very principles upon which our beloved country was founded, and in the defense of which your sons have so lately given their lives and their limbs; who are striving to make the individual subservient to the state—nothing more than a cog in the wheel; who are seeking to destroy forever the principles of equality to all and free enterprise under the exercise of which the United States has become the greatest nation on earth; who are endeavoring by every means known to them to foist upon true-blooded, red-blooded Americans the foul isms of decadent nations, of peoples who love not America nor her people.

America needs leadership, and it is your sacred duty and mine, in so much as it lies within our power to do so, to help develop that leadership, not only that our industry may be prosperous, but that our country may be free.

Equipment Failures Must Be Reduced

By The Hon. W. J. Patterson

Member, Interstate Commerce Commission, Washington, D. C.

I congratulate the Mechanical Division, its officers and members upon the magnificent job of maintaining rolling equipment in suitable condition for expeditious transportation during the most difficult war period. Material was scarce. Substitutes had to be used to a considerable extent. Man-power was hard to get, and, to a large extent, inexperienced. As a result of these conditions and the intensive use of equipment, it gradually deteriorated until now it has reached the point where equipment failures are perhaps the greatest contributing factor in train delays, and such delays are becoming more numerous. These conditions, accompanied by a let-down of inspection, also resulted in an increase in accidents.

It is time now to commence to restore the efficiency of the plant. Perhaps 25 per cent of the cars now in service should be retired without delay. I understand 500,000 freight cars are more than 26 years old, and for the last five years you have been getting two years' mileage out of each year's service. There is perhaps need for 150,000 new freight cars, a large part of which are long overdue. Empty good-order cars are mighty scarce at the present time.

Some Recent Developments

The commission, by order of September 21, 1945, required that on or before January 1, 1949, air brakes conforming to certain specifications be installed on all cars used in freight service, except those equipped with passenger-car brakes. If it is necessary to extend the time within which cars used in interchange must be equipped, it will be because the manufacturers have failed to deliver the equipment. The railroads are absorbing all the equipment they can get.

Hand brakes on passenger-train cars are not as well maintained as those on freight cars, perhaps due to the relative infrequency of their use. However, when an emergency arises in which human safety is involved, an efficient hand brake is just as necessary on a passenger car as it is on a freight car.

The manner of detail construction and maintenance of cars is important. During the last six years we have investigated 12 accidents which were directly or indirectly caused by failure of some part of a car. These accidents resulted in the death of 109 persons and the injury of 361. Four were caused by broken journals, two by broken wheels, two by defective couplers, one by a defective equalizer bar of a passenger-car truck, one by a broken truck side-frame, one by a loose wheel and improper adjustment of side-bearing clearance, and one in April of this year by a loose wheel on a passenger-train car, which had been turned down to full tread and flange contour and remounted on a second-hand axle. Several, if not all, of these accidents probably could have been averted by proper inspection and maintenance, and by better devices and methods for testing materials.

Expedite Car Repairs

I direct your attention to the need for thorough inspection and prompt repair of cars. This is essential both for accomplishment of the humanitarian purposes of the law and to procure efficient and safe operation.

According to our records, 2.58 per cent of the total number of freight cars, passenger train cars and locomotives inspected by the commission during the first year of the war had defective safety appliances, and this percentage gradually increased to 3.19 per cent during the last year. This increase in defects indicates a relaxation in inspection and maintenance, and is probably accounted for in large measure by the shortage of material and man-power necessary to cope with the abnormal wear and tear and the stress of war-time conditions in general. This situation should promptly be improved.

Many persons responsible for the movement of cars through interchange either do not have a proper understanding of the requirements of law or are not sufficiently concerned about them. It should be emphasized that there is an absolute legal prohibition against the interchange of cars having defective safety appliances, that a carrier which either delivers to, or receives from, a connecting line such defective cars does so at its peril, and that both the delivering and receiving carriers are equally liable.

Braking Ratios

I have from time to time discussed with various committees of this division the matter of braking ratios for freight cars. For years braking ratios, based upon the loaded weight of freight cars, have been entirely too low. Freight cars are now being built with a braking ratio, based on the gross weight, of 18 per cent, and some even lower. If, as is quite possible, a train were composed entirely of such cars, each loaded to full carrying capacity, it would be dangerous to operate such a train at anywhere near normal speed. Freight trains are increasing in length; likewise speeds are increasing. The light weight of the car is becoming a progressively smaller proportion of the loaded weight. This is a bad situation and something should be done about it; otherwise, the maximum speed of freight trains must be reduced to maintain reasonably safe operation. I am informed that an automatic "compensating" brake has now been developed for freight cars and is ready to be tested in service. The matter

of perfecting such a device should receive preferred attention by the railroads.

In pre-war days, the principal railroads developed and practiced standards of repair and maintenance of locomotives which were followed generally by all railroads and which resulted in the fiscal years ended June 30, 1939, 1940, and 1941, in locomotives being kept in the best condition, the least number of accidents, and the least number of casualties due to locomotive failures ever attained over a comparable period. The acute need for locomotives during the war created conditions which made it impossible to adhere to the high standards previously observed. For instance, obsolete equipment that had previously been scheduled to be retired was restored to service, many skilled employees were lost, there were shortages of materials and of finished replacement parts, and the making of emergency repairs of a temporary nature became necessary. As a result, the general condition of locomotives deteriorated. Accidents and casualties increased.

Locomotive Defects Increase

The trend in defective locomotives, with consequent occurrence of accidents and casualties, has continued to be upward since V-J Day. There has been an increase in the number of locomotives found by our inspectors with defects that should have been corrected before the locomotives were put into use, and increases in the number of accidents and casualties attributable to locomotive failures in the first eight months of the last fiscal year, compared with a similar period in the preceding year.

Necessity for modification of the outstanding rules and instructions for the inspection and testing of steam locomotives and tenders and their appurtenances was indicated. (Mr. Patterson here referred to three locomotive safety devices, namely, emergency brake valve, tank water level indicator and reserve air or steam-operated power reverse gear which are required on steam road locomotives built on or after March 1, 1941, and on existing locomotives not later than June 1, 1948.—*Editor.*)

Much has been said about man failures in connection with accidents to trains. When men in train and engine service encounter an emergency situation they must, in a matter of seconds, make a decision as to what shall be done to avoid an accident. It requires skill and sound judgment, quickly and accurately exercised. This can be done only by men with knowledge, training and experience. Under such circumstances nothing can take the place of experience.

What I have said with respect to train and enginemen applies with equal force to yard and interchange car inspectors. These men should not only be familiar with the Safety Appliance Acts and related orders, but should also have a thorough knowledge of rules governing the interchange of and repairs to cars. They should be familiar with the Manual of Standard and Recommended Practice, the Wheel and Axle Manual, Rules Governing the Loading of Commodities on Open Top Cars, as well as the rules for the Maintenance of Air Brakes and Air Signal Equipment on Locomotives and Cars. Here, again, judgment must be exercised quickly and accurately, which requires knowledge, training and experience.

The same can be said with respect to locomotive inspectors, to the extent that it applies to their particular field. This matter is becoming more important and more complicated with the general use of Diesel-electric locomotives.

Trained Employees Essential

The proper training and utilization of employees and officials is one of the important problems for the railroads to solve.

All available knowledge bearing upon the construction of locomotives, cars, and related devices should be available to all who are interested. Research has been given more or less consideration by this division for many years. Some railroads have for a long time had research departments, but there has not been a sufficient co-ordination of their activities, nor interchange of ideas and results, to reach all the railroads. Better standardization of rolling equipment that is constantly interchanged and intermingled could well be the number one job of this Division. It would certainly improve your safety program.

You have perhaps observed that nearly every passenger-carrying railroad proposes to operate at least one streamlined high-speed train to meet public demand. Too often sight is lost of the fact that to operate successfully and safely such a train requires a track structure adapted for high speed, properly signalled and well maintained. The rolling equipment must be rugged, frequently inspected, and all defects promptly corrected. Otherwise, these trains are a menace to the railroad and the public.

Car Supply the Job Ahead

By Clark Hungerford

Vice-President, Operations and Maintenance Department,
Association of American Railroads

Just a few years ago there were a good many people who seemed to have the idea that in the future of America there was no large place for the railroads. Newer forms of transport were absorbing popular interest. Then came the test of the second World War and the realization that despite all that had been done by other forms of transportation there was nothing which could do for this country what its railroads can.

Car days by reasons of measures adopted were multiplied two or three times so that the product of transportation exceeded all expectations. Millions of service miles were run out by these "veterans of the rails" with little or no chance for replacement or rehabilitation. Scarcities in the labor and material supply prevented the rebuilding and renewals so urgently needed to keep the supply and condition of freight-car equipment at normal levels. Thus the war years took their toll of the freight-car supply—service life was run out faster than it could be replaced or built back into them.

More Cars Needed

In 1944 17,600 new box cars were installed and 21,100 more were put on the rails in 1945 but these hardly equalled the 40,000 lost through retirement in these last two years of the war. Some 10,000 new box cars have been received for the seven months' period ended July 31, 1946, and some 24,000 more are now under construction and on order to further augment the supply. Even with these additions and other thousands which will be added as materials become more accessible many acute shortages will be experienced before the supply again approaches a normal level.

The number of 400,000 is not one to cause much concern in a nation where terms in millions and billions are commonplace, but still it is a figure that will impress and cause nation-wide planning and action by industry and the railroads when it is practically the number of box cars that the shippers of America are loading each week—396,076 carloads of box-car freight for the week ended July 20 and 394,000 for the week ended July 27, the last two weeks of record—an average increase of 26,343 carloads or 7.2 per cent over the loadings for the weeks of August 4 and August 11, 1945, the last two weeks of the war.

Four hundred thousand cars loaded per week out of a total number of approximately 700,000 serviceable box cars means but one thing, the obtaining of the maximum use possible of those box cars. Concurrently with this demand for box cars comes one of the heaviest requirements for open-top cars. The large export coal program plus the domestic demand for coal to drive reconversion and replenish stock piles depleted during the coal strike of April and May has resulted in an unprecedented demand for coal cars. For the weeks of July 13, 20 and 27, the last three weeks of record since the July 4 holiday, coal loading has aver-

aged nearly 190,000 cars per week, with the week of July 20, when 190,386 cars were loaded, being the heaviest week of coal loading in more than ten years. Such substantial coal loading plus the heavy demand for other commodities requiring the use of open-top equipment also means but one thing—obtaining the maximum use possible of open-top cars. And this despite the fact that some 50,000 hoppers and gondolas have been delivered new to the railroads during the past two and a half years.

In order to provide the transportation this country needs it will be necessary for many months to come that we continue to extend every effort to secure the maximum use of every car every day. This means expeditious handling by the railroads, the expanding and speeding up of repair programs, so that bad-order cars can be restored to service as quickly as possible, prompt loading and unloading by the shippers and receivers, and the maximum practicable load per car. It is not a question of waiting until there are more cars or waiting for the traffic to subside; it is a question of doing the best we can with what we have and doing it now.

Your Mechanical Division, representing as it does the highest standards and achievements in equipment maintenance and manufacture, reflects a solidarity of purpose so necessary to the continued advancement of the railroad industry as it emerges from the war years to accept the challenge of the transportation future.

You, as railroaders, are important parts of that tremendous transportation machine of the American railroads. We have seen how necessary and how vital to victory was the work of that machine in the war just passed. Likewise, its services are no less essential in the years of peace ahead of us. Without its successful working there can be no real reconversion in this country, no substantial relief to the despairing peoples abroad.

Discouraging Outlook

I should like to be able to report to you that everything is promising for the smooth and successful working of the railroads, but unfortunately at the moment the outlook is not too encouraging. At the same time that traffic has receded, operating expenses have increased. You are all familiar with the rises in prices of mechanical equipment, supplies and fuel used by the railroads during the war period. Since the close of the war that rise has continued. It is estimated by the Bureau of Railway Economics that on the basis of this year's operations, the price rises in these items will add more than $500,000,000 a year to railway operating costs over and above what they would have been on a 1941 basis.

During the same five years there have been three general increases in railway wages, and wages, as you all know, constitute more than half of the railway operating costs. Again figuring on the basis of 1946 employment the increases in wages granted in 1941 added $360,000,000 a year to operating costs. The 1943 wage increase added $334,000,000, and the 1946 wage increase added $675,000,000. To this total increase of $1,369,000,000 per year in wage cost since 1941 there should be added the additional pay roll taxes on the wage increases amounting to $82,000,000.

That makes the total increase in railroad expense this year almost $2,000,000,000, of which almost half or nearly $900,000,000 per year is the result of wage increases and price rises since January 1, 1946.

And on top of that was the enactment into law last week of the Crosser bill, which increases railroad retirement taxes and adds approximately $85,000,000 more per year to the railroad bill.

During the first six months of the year freight rates remained on the same level as they were before the war started in Europe seven years ago. The result was a drop in railway net income from the $274,000,000 earnings in the first six months of 1945 to a net deficit of $43,000,000 in 1946. Effective July 1, 1946, the Interstate Commerce Commission after summary proceedings and pending more extensive investigation authorized an increase in freight rates estimated to produce about $170,000,000 in added revenue in the last half of 1946 or something more than $300,000,000 on an annual basis. The commission has under advisement the matter of further increases as to which it is conducting hearings this month.

Traffic Down; Car Demand Up

Nor are these financial difficulties the only obstacles confronting the railroads in this trying period of reconversion. Traffic in general as measured in tons of freight carried one mile has decreased during these months of 1946. But there has been no such corresponding decrease in the demand for freight cars. Instead the demand for certain types of equipment, notably box cars, is greater than it was during the war.

The demand for freight cars has increased partly because of a slowing down in the average turn-around time, partly because the average load per car is less than a year ago. The demand for box cars is particularly increasing because of exceptional harvests this year and because a greater proportion of box cars are used to carry less-than-carload freight partly due to the pressure of deliveries which cannot be made in carload lots because of production difficulties.

So I repeat, to meet the demand for freight cars it is going to be up to all of us—and this applies to the railroads certainly as much as to the shippers and receivers of freight—to get the maximum use out of every car every day. That will call for alert transportation operations, for aggressive dealing with mechanical problems, for concentrated attention to the procurement of the materials and supplies without which it is impossible to keep the equipment in good order to operate these railroads.

Report on Prices for Labor and Materials

The changes in material prices and labor costs have been reviewed and revisions made where warranted

[The members of the Committee on Prices for Labor and Materials are: J. D. Rezner (chairman), superintendent car department, C. B. & Q.; T. J. Boring (vice-chairman), general foreman, M. C. B. Clearing House, Penna.; H. H. Boyd, assistant chief motive power and rolling stock, Can. Pac.; A. H. Gaebler, superintendent car department, General American Transportation Corp.; G. J. Flanagan, general car inspector, N. Y. C.; J. J. Root, Jr., vice-president, Union Tank Car Co., and P. F. Spangler, assistant superintendent motive power, St. L.-S. F.]

In order that the rules may currently provide an equitable basis for inter-road billing, your committee has continued the work of analyzing material, labor and new equipment costs in A.A.R. Interchange Rules 98, 101, 107, 111, and 112 of the Freight Car Code, and Rules 21 and 22 of the Passenger Car Code, with a view of determining and recommending necessary changes to be made in the next supplement to the current code.

Freight Car Rules

Rule 101

All miscellaneous material prices in Rule 101 were rechecked as of April 1, 1946. Quotations submitted by the purchasing agents of the ten selected railroads, representing 39 per cent of the total freight car ownership in the United States and Canada, showed an upward trend in material markets as indicated by detail recommendations for revisions shown under this rule.

A new Item 66-A is added, to provide an allowance for new type AB brake cylinder non-pressure head.

Item 105-A is modified to include a composite type malleable iron and pressed steel journal box lid.

In view of the changes made in Rule 120 in the 1946 Code

and further changes recommended by the Arbitration Committee in its 1946 Report, Item 194-B is eliminated, as well as the paragraph following Item 201.

Item 210 is modified to provide penalty price on the same basis as scrap allowance for all No. 2 brake beams applied as new or R.S.S. & T.

Based on new studies made on five railroads which resulted in the adoption of revised methods of computing R.S.S. & T. and average credit allowances, modified R.S.S. & T. and average credit prices are recommended for No. 2 plus, No. 3 and No. 15 brake beams under Items 211, 212, and 213, respectively.

All combination labor and material allowances were modified in Supplement No. 1 to the 1946 Code, effective May 1, 1946, to conform with revised A.A.R. labor rates brought about by an increase in hourly wage rates paid to car-repair men.

Rule 107

A new second note is added following Item 240-A, to indicate the work which must be performed to justify charge under Items 239, 240 or 240-A.

Interpretation No. 5 is modified to clarify the intent.

Immediately upon receipt of the announcement of the 16 cents increase in hourly wage rates paid to employees engaged in car repairs, Item 105-A covering freight car labor was increased to $1.90 per hour and key items in this rule reviewed and modified accordingly, and these changes were announced in a circular letter issued by the Secretary on April 5, 1946, effective as of April 1st. All combination labor and material allowances were later reviewed and modified in Supplement No. 1 to the 1946 Code, effective May 1, 1946.

Based on new time studies made on five railroads, Item 281 is completely modified, to provide revised tables and allowances as well as changes in the wording.

A new Item 281-A is added to provide separate allowances for the removal of old tack or fillet welding from car parts.

A new Item 281-B is added, to provide separate and average allowances per truck side for preheating, preparation, welding and normalizing of cast steel truck side frames.

A new Item 281-C is added, to provide separate and average allowances per hole for welding holes exceeding 1½ in. in diameter in top chord angles of gondola cars.

Rule 111

All combination labor and material allowances were modified in Supplement No. 1 to the 1946 Code, effective May 1, 1946, to conform with revised A.A.R. labor rates brought about by the 16 cents increase in hourly wage rates paid to employees engaged in car repairs.

Rule 112

Recommendations are made in this rule respecting reproduction pound prices of new freight cars of all classes, in order that the supplement of August 1, 1946, may reflect 1945 costs in lieu of figures shown in the present code. New prices recommended are based on the cost of 27,064 freight cars constructed during the year 1945.

Paragraph 4 of Section B is modified, to provide the settlement basis for Class LRC cars used for the transportation of solid carbon dioxide (dry ice).

Passenger Car Rules

Rule 21

Items 18A, 20L, 20M and 20N are modified to clarify the intent that respective allowances include jacking of car.

A new note is added following Item 23 to clarify the intent with respect to allowances in Items 21, 22, 23, and 24.

A new Item 27 is added to provide allowances for roller bearing units R. & R. or renewed separately in connection with certain wheel-changing operations.

Immediately upon receipt of the announcement of the 16 cents increase in hourly wage rates paid to employes engaged in car repairs, Items 19, 19-A and 20 covering passenger car labor were modified accordingly. and these changes were announced in a circular letter issued by the Secretary on April 5, 1946, effective as of April 1st. All combination labor and material allowances were later reviewed and modified in Supplement No. 1 to the 1946 Code, effective May 1, 1946.

Rule 22

All combination labor and material allowances were modified in Supplement No. 1 to the 1946 Code, effective May 1, 1946, to conform with revised A.A.R. labor rates brought about by the 16 cents increase in hourly wage rates.

It is the intent of the committee to investigate labor and material costs again in October and if sufficient change develops, necessary revisions will be made and inserted in the rules effective January 1, 1947.

Your committee recognizes the uncertainty of present price conditions and feels that in the event of further changes in price quotations on major items of material prior to the next regular semi-annual solicitation from the ten selected railroads as of October 1st, it should determine whether such changes warrant immediate revision and take the necessary action to place in effect whatever revisions in price rules may be approved.

[The changes recommended in the rules are shown in detail in the report.—Editor.]

Supplementary Report

Freight Rule 101 and Passenger Rule 22

In accordance with the last paragraph of page 3 of the report of the committee, dated May 20, 1946, further investigation of material prices has been made and quotations have been secured as of June 1, 1946, on draft gears, brake shoes, couplers, coupler parts and lumber. Computation of the basis of these quotations reflects increases in all of these items over present prices and those recommended in the report dated May 20, 1946.

[The supplementary report listed the changes in detail and recommended that they be made effective on August 1, 1946—Editor.]

Freight Rules 101, 107, and 111 and Passenger Rules 21 and 22

Immediately upon receipt of the announcement of the additional 2½ cents increase in hourly wage rates paid to employes engaged in car repairs, the A.A.R. labor rates and key items in Freight Car Rule 107 and Passenger Car Rule 21 were modified to conform as announced in circular letter issued by the secretary on May 29 to become effective June 1, 1946.

All combination labor and material allowances are being reviewed and it is proposed to include the modifications made necessary because of the increased labor rates and material allowances (where involved) in the supplement effective August 1, 1946.

(The report was accepted.)

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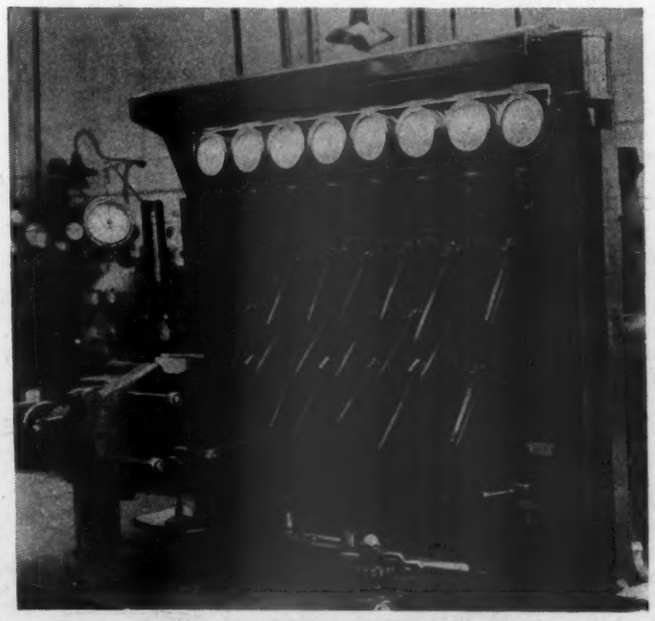


AB brake test rack equipped with special reflecting hood and fluorescent lights at the top to give good illumination of the gauges and at the same time keep glare out of the eyes of the test-rack operator

Report of the Committee on Car Construction

Designs of five lightweight cars proposed for adoption as alternate standards—Changes in welding regulations for trucks and couplers

[The members of the Car Construction Committee are: T. P. Irving (chairman), engineer car construction, C. & O.; E. P. Moses (vice-chairman), engineer rolling stock, N. Y. C. System; R. B. Winship, mechanical engineer, Can. Pac.; J. McMullen, consulting engineer, Erie; H. L. Holland, engineer car construction, B. & O.; F. J. Jumper, general mechanical engineer, U. P.; R. D. Bryan, mechanical assistant, A. T. & S. F.; L. R. Schuster, engineer car construction, Sou. Pac.; L. H. Kueck, assistant chief mechanical officer, Mo. Pac.; J. K. Peters, mechanical engineer, D. & R. G. W.; W. A. Pownall, assistant to general superintendent motive power, Wabash; J. A. Gower, assistant mechanical engineer, Penna., and F. G. Moody, superintendent car department, Nor. Pac.]

T. P. Irving,
Chairman

The 1939 and 1940 reports of this committee outlined a program for the development of lightweight box-car designs in cooperation with the Freight Car Design Committee of the American Railway Car Institute. Tentative designs for four types of construction were submitted for study and analysis. From year to year since that time, reference has been made to conditions which prevailed making it necessary to defer the work until a later date.

In the 1943 report reference was made to Emergency Designs including several composite types of freight cars made necessary on account of greater demand for steel for national defense. Designs of 50-ft. 6-in. steel-sheathed box and auto box cars 10 ft. 6 in. high inside were submitted, adopted by letter ballot as standard designs and are ready for inclusion in this year's revision of the Supplement to the Manual.

50-Ton Lightweight Welded Box Car

The designs for a 50-ton lightweight welded box car are completed and are included in Appendix A (omitted in this abstract of the committee's report). It is recommended that these designs be submitted to letter ballot for adoption as alternate standard. This design will have clear inside dimensions of: Length, 40 ft. 6 in.; width, 9 ft. 2 in.; height at eaves, 10 ft. 6 in.; estimated lightweight (body), 26,000 lb.; trucks (with chilled-iron wheels), 15,600 lb.; total weight on rail, 41,600 lb.; approximate saving in weight under A.A.R. standard box car, 5,200 lb.

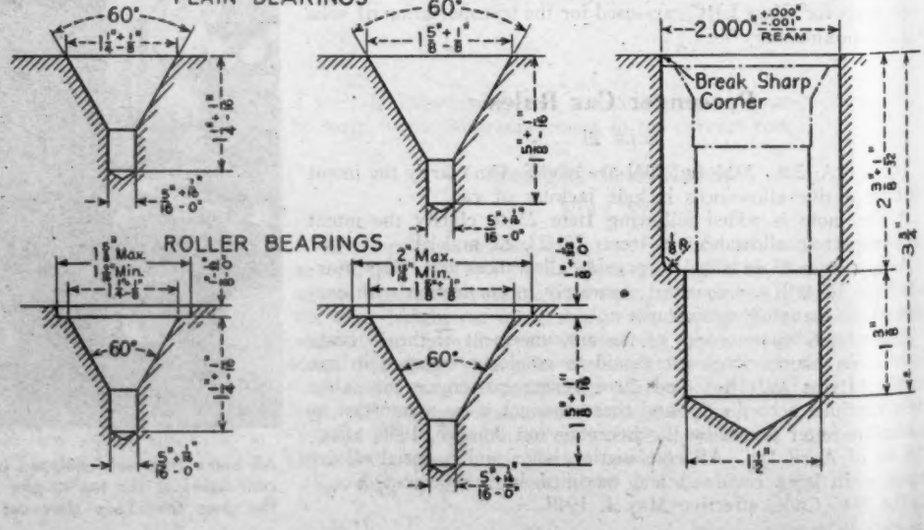
Designs for a 50-ton lightweight fixed-end steel gondola car were completed and included in Appendix A. This design will have clear inside dimensions of: Length, 41 ft. 6 in.; width, 9 ft. 6 in.; height, 4 ft. 8 in.; estimated lightweight (body), 23,700 lb.; trucks (with chilled-iron wheels), 15,600 lb.; total weight on rail, 39,300 lb.; approximate saving in weight under A.A.R. emergency standard gondola car, 6,200 lb.

Designs for 50-ton and 70-ton lightweight hopper cars, also included in Appendix A, will have the general dimensions shown in the accompanying table.

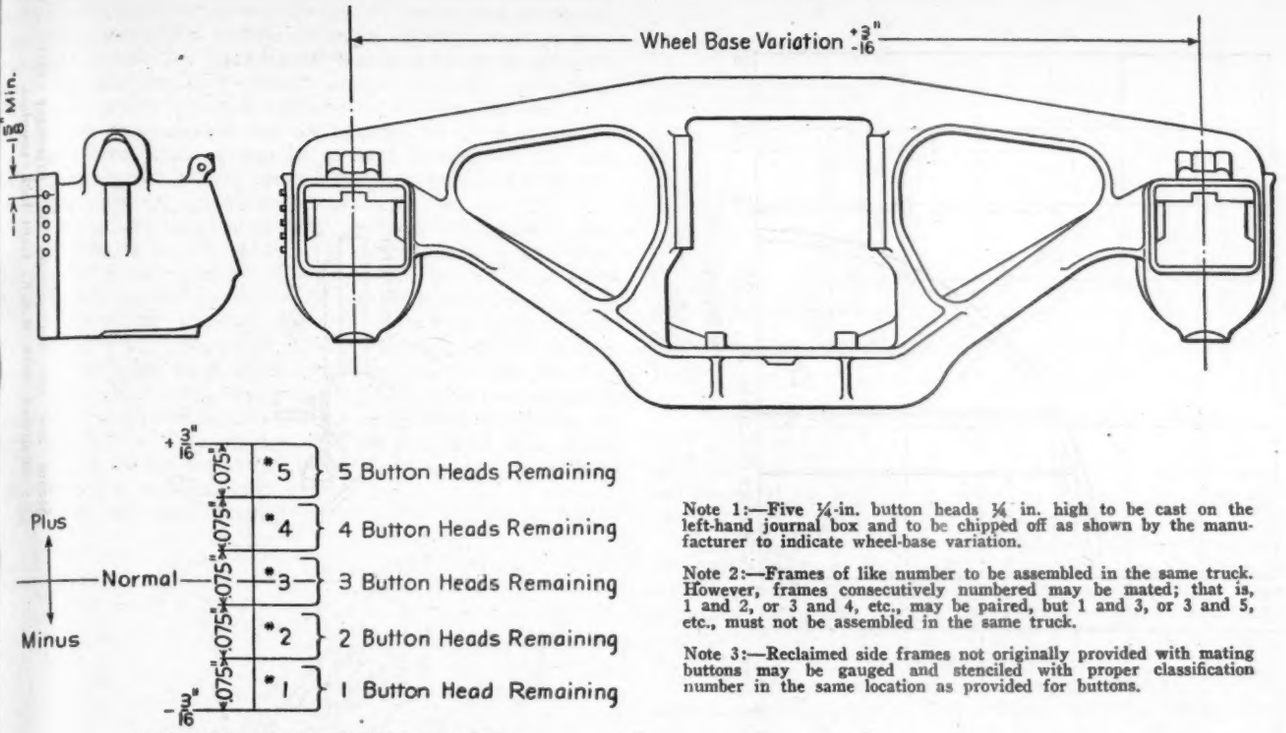
General Dimensions of Lightweight Hopper Cars

	50-ton hoppers	70-ton hoppers
Inside length, ft.-in.	35-0	41-8
Inside width, ft.-in.	10-4	10-4
Height rail to top of side, ft.-in.	10-8	10-8
Cubic capacity level full, cu. ft.	2,209	2,824
Cubic capacity with 10 in. av. heap, cu. ft.	2,497	3,156
Estimated light weight (body), lb.	23,300	27,200
Trucks (with chilled-iron wheels), lb.	15,600	18,100
Total weight on rail, lb.	38,900	45,300
Approximate saving in weight under A. A. R. standard hopper cars, lb.	2,500	2,600

The committee co-operated with the American Railway Car Institute, who prepared the design of a 50-ton lightweight merchandise box car for high-speed service made of high-tensile low-alloy steel, welded and riveted construction. This design, acceptable in interchange service under the provisions of Interchange Rule 3, will have clear inside dimensions of: Length, 50 ft. 6 in.; width, 9 ft. 2 in.; height at eaves, 10 ft. 5½ in.; lightweight of body, 30,400 lb. If any railroad desires to have cars built under this approval all necessary data covering the de-



Recommended practice in axle centering (finish dimensions)—Depth of counterbore in rough axle shall be increased from that shown to compensate for stock allowed to face axle—For axle centers for tubular axles, roller bearings, see D-4-C, plain bearings, D-6-A



Note 1:—Five ¼-in. button heads ¼ in. high to be cast on the left-hand journal box and to be chipped off as shown by the manufacturer to indicate wheel-base variation.

Note 2:—Frames of like number to be assembled in the same truck. However, frames consecutively numbered may be mated; that is, 1 and 2, or 3 and 4, etc., may be paired, but 1 and 3, or 3 and 5, etc., must not be assembled in the same truck.

Note 3:—Reclaimed side frames not originally provided with mating buttons may be gauged and stenciled with proper classification number in the same location as provided for buttons.

Uniform method of marking to permit pairing cast-steel truck side frames

sign will be available from the American Railway Car Institute, 19 Rector street, New York 6, N. Y.

Drawings have been prepared covering the recommended manner of converting composite box and hopper cars, including selective-type ballast cars. These have been approved by the committee and will be available in the secretary's office for those desiring prints.

Standard Designs Generally Followed

One of the tables in the committee report showed that of 17,125 box and auto-box cars ordered from May 1, 1945, to May 1, 1946, 7,750 cars were A.A.R. standard throughout; 8,375 were A.A.R. standard except for minor variations in inside height and width; 1,000 were A.A.R. standard except for floating center sills and 6 in. over standard height.

Of 9,125 50-ton hopper cars, 6,775 were A.A.R. standard throughout; 350 had minor variations in width and length; 2,000 were A.A.R. standard except for floating center sills. Of 300 70-ton hopper cars, all were A.A.R. standard throughout except 50, which retained standard Z-section center sills and 25¾-in. truck height. Of 750 freight refrigerator cars, 500 were A.A.R. standard and 250 had overhead ice bunkers, but standard center sills and truck height.

To summarize, all new house and hopper cars ordered in the period mentioned, except the refrigerator cars, totaled 26,550 cars, of which 26,500 cars, or 99.81 per cent, were A.A.R. standard throughout or conforming thereto, including lightweight alloy-steel to A.A.R. base dimensions, floating center sills and inside dimensions to specific conditions. Of 37,026 cars listed, which included 9,726 gondolas, flat, ballast and special type cars, 36,276 cars, or 99.19 per cent, have standard 25¾-in. center plate height and 300 cars, or 0.81 per cent, have 26¾-in. center plate height.

The report listed 14 new designs for a total number of 915 cars for nine owners which were reviewed by the committee, between May 1, 1945, and April 30, 1946, in accordance with the provisions of the first paragraph of Rule 3 and approved for interchange service.

The report also included a description and drawings of recommended practice in axle centering, journal dimensions for roller-bearing tubular axles and standard application of wheel-slide-control devices.

Side Frames and Bolsters Approved

Sixteen new designs of truck side frames and 12 new designs of truck bolsters were shown in the report approved for interchange service since April 15, 1944, including Barber Stabilized swing motion, Type S-4-L and double-truss spring plankless; Timken outboard roller-bearing high-speed (limited); Cardwell stabilized double-truss; A. S. F. Ride-Control Type A-3 for both plain and roller bearings (limited); Cushioned lateral and vertical motion (limited); and self-alining double-truss spring-plankless. In general, these designs included both Grade B carbon-steel and high-tensile alloy-steel construction for 50-ton and 70-ton cars.

This part of the report also contained a list of 21 applications for approval for side frames and 14 for bolsters, as of April 15, 1946.

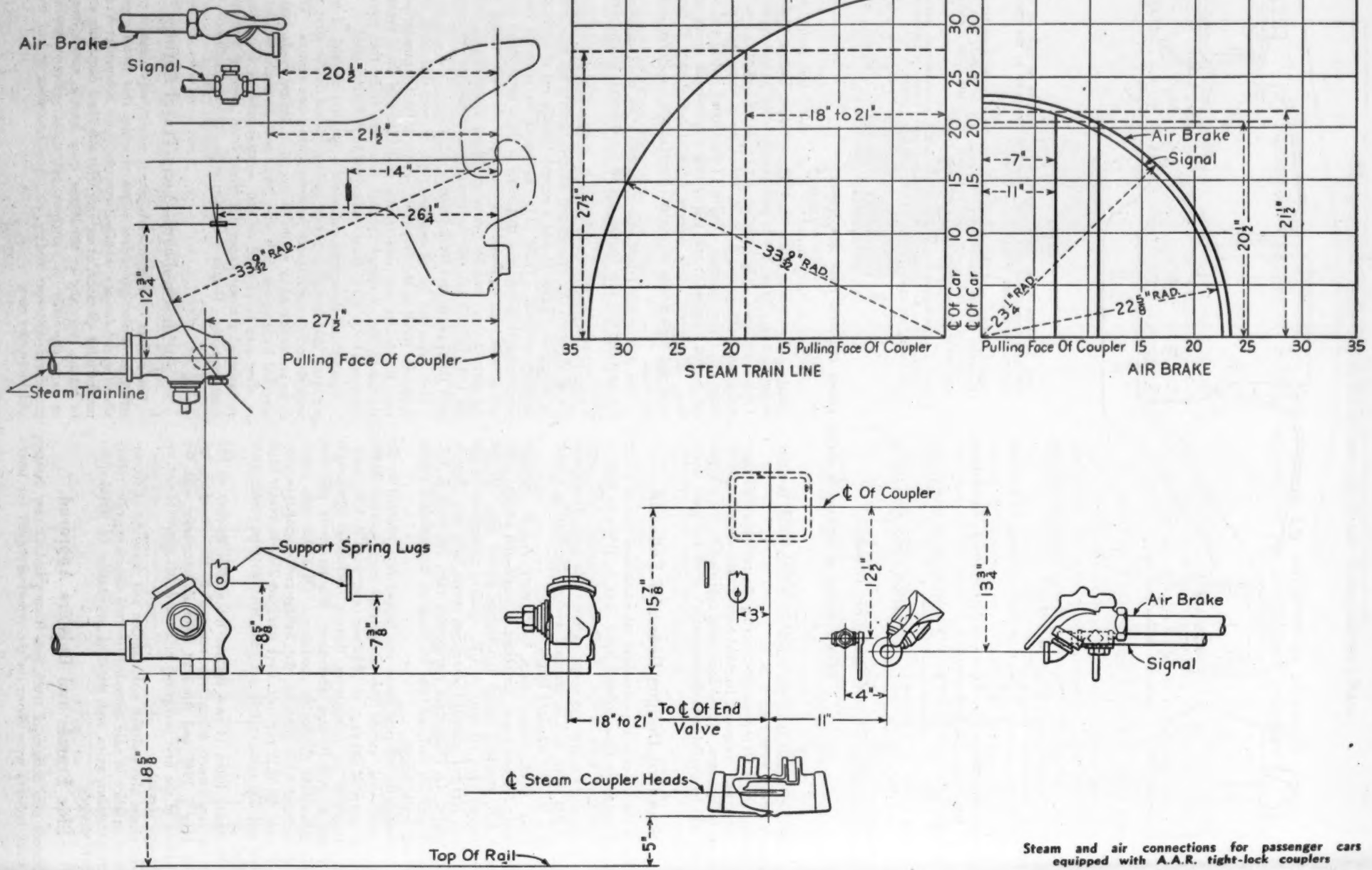
Due to the lapse of three years since submission of a complete list of approved side frames and bolsters, such a list was included in the report (Table I) and a second detailed list of applications pending approval (Table II). Reference to previous lists of pending applications show that some of these applications for approval have been pending for a long time. In each of such cases the manufacturer has not yet arranged for the necessary tests or the tests have failed and the manufacturer has not yet complied with the requirements for a retest.

It is important for all member roads to note that some of the approvals listed in the first table are for a limited number of car sets, and before any side frames or bolsters of these types are purchased the purchaser should ascertain from the secretary whether or not all of those authorized have been applied.

Another sub-committee suggested a uniform method of marking truck side frames to permit pairing frames on the same truck with respect to the distance between journal-box centers. This is to be accomplished by means of five ¼-in. button heads, cast in a specified location on each side frame and arranged so that one or more may be chipped off, the remaining heads indicating the variation of this particular side frame from standard journal-box center spacing. Details are given in one of the drawings.

Spring Snubbers—Long-Travel Springs

The subject of damage to lading in transit was brought to the attention of the committee, which reported that factors responsible for the damage include particularly the following: Vertical uncontrolled vibration of springs with attendant damaging shocks to lading, especially at the higher train speeds; rough handling of cars, especially in switching operations; inferior quality of containers; improper loading, etc.; heavier loading of l.c.l. freight and forwarder cars.



Steam and air connections for passenger cars equipped with A.A.R. tight-lock couplers

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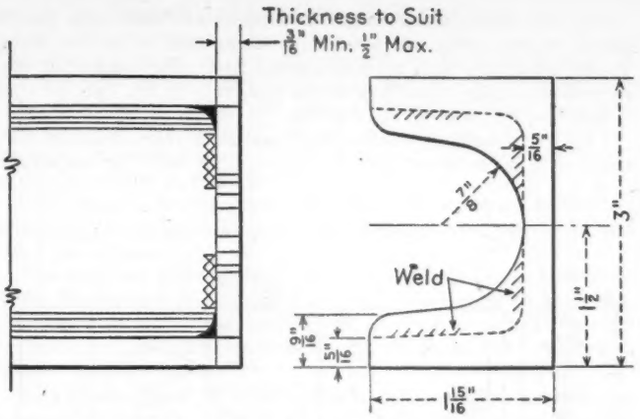
It is the consensus of the committee that the use of snubbing devices will materially reduce damage to freight and equipment caused by uncontrolled vertical action of standard truck springs, and it is recommended that consideration be given by all car owners to the adoption of a program under which all interchange freight cars will be equipped with efficient snubbing devices.

It is also recommended that consideration be given to the use of longer-travel truck springs on all new freight cars and that existing equipment having present standard springs be changed to longer-travel springs where practicable.

It is recognized that truck-spring snubbing devices have a definite effective service life and it is recommended that a plan of inspection be inaugurated by the car owners to determine when these devices should be removed for repairs or replacement.

A sub-committee reported that service-life tests have recently been initiated on 310 car sets of helical springs installed on Berwind-White freight cars, which are confined to the same territory so that the service can be observed closely. These springs include 100 car sets of A.A.R. 1936 springs, 100 car sets with the proposed A.A.R. 1944 springs, 100 car sets with 2-in. travel springs and 10 car sets with 2½-in. travel springs. Results of this test will be reported later.

The sub-committee assigned to study the revision of brake-beam and shoe design reported contact with the manufacturers and recommended that the modifications approved by letter ballot in 1944 be made tentatively effective January 1, 1947.



Method of lengthening brake-beam compression members

The report called attention to brake-beam failures due to tension rods breaking in threads at the base of the nuts, resulting in serious delays and expensive derailments, and to reduce these failures recommended the use of Whitworth threads and other revision in repair methods, as shown in Exhibit A (not included in this abstract of the committee's report).

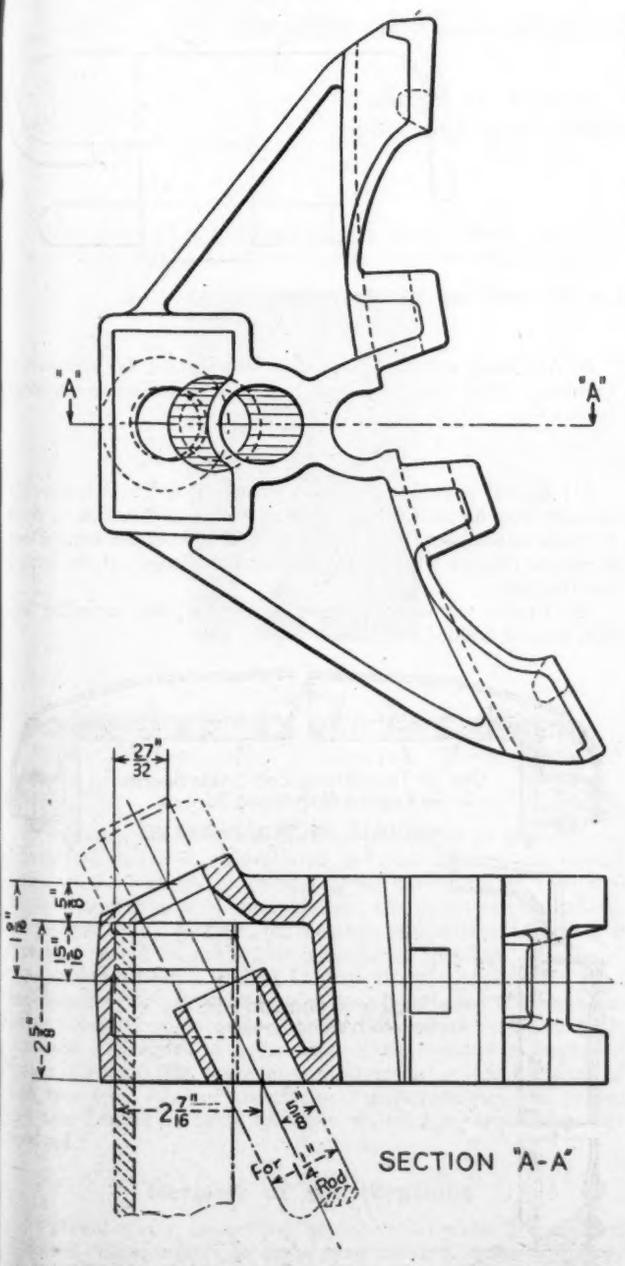
The committee reported that it is investigating methods of preventing disengagement of brake heads from the compression member in case of a broken tension rod and also other means of keeping brake heads from shifting when tension rods fail. In view of service performance, the sleeve-type brake head is recommended as A.A.R. alternate standard.

The report included drawings of a pressed-steel spring plank design, suggested for adoption as recommended practice, also a design of draft-key retainer recommended by the Committee on Couplers and Draft Gears and suggested for adoption as alternate standard.

Other subjects covered in the report included standard location of AB-brake release rods, steam and air connections for passenger cars equipped with tight-lock couplers, application of lading strap anchors to door posts, and passenger-car foundation brake gear.

With regard to the building up of worn surfaces on draft keys by fusion welding, the committee concurred with the coupler committee in recommending that this be not permitted but that the keys be reclaimed by the reforging process.

The report included specific changes in the welding regulations covering truck side frames, heat treatment after welding, emergency welding regulations and limitations, general instructions for the welding of couplers and cast-steel yokes, location and extent of cracks which may be welded in couplers and cast-steel yokes, conversion of 6½-in. to 9⅛-in. butt couplers.



Alternate sleeve brake head for No. 15 brake beam—Other dimensions and details are the same as shown on Page E-84-A

General Instructions for Welding Couplers

(1) Welding of cracks in couplers and cast-steel yokes is to be done by the electric process, using a shielded-arc electrode.

(2) Cracks in couplers must be prepared for welding by single vee-ing, as per Fig. 2 of Sec. B, so that the welding will all be done from the outside.

(3) Cracks in yokes, if both sides of the fractured members can be worked upon, should be prepared as per Fig. 1 of Sec. B, and the welding done from both sides. If only one side can be worked upon, the preparation should be as per Fig. 2 of Sec. B, and the welding done from the outside.

(4) In all cases, the entire crack should be cut out far enough back so that no portion of the crack will remain in the metal, and the surfaces where new metal is to be deposited must be clean and reasonably smooth.

(5) If a gas pocket is encountered when cutting out a crack or making a weld, and it cannot be entirely removed, the part must not be reclaimed.

(6) On couplers, welds must be dressed off so that there is no projection on the front face, inside of guard arm, or bottom of shank. Also, no projections or beads will be allowed inside the knuckle or lock cavities which might interfere with operation of the coupler.

(7) On yokes, welds must be dressed off flush with parent metal on the inside and outside of straps and in the key slots. Front end of key slots must be gauged from rear bearing surface of yoke to insure equal lengths on each side of the yoke so that it will line up properly in assembly.

(8) After welding, couplers and cast-steel yokes must be normalized in accordance with the practice set forth in paragraph 6 of the Recommended Practice, Fusion Welding and Bronze Welding Limits and Regulations, Section L, of this Manual.

(9) Couplers and yokes reclaimed by welding must be legibly stamped in letters at least ⅜ in. high (surface of part to be smoothed off by grinding or other means before stamping) to indicate railroad reporting marks, date, shop identifying symbol and welder's identification number or marks arranged in form shown in Para. 7 of Sec. A. On couplers this marking is to be on the knuckle side of the horn, except for welds in knuckle side wall which should be on or adjacent to weld. On yokes the marking is to be on the side of the head.

Extent of Cracks Which May Be Welded

Couplers

(1) Transverse cracks, including shrinkage cracks, in shank of coupler from rear end of shank to and including back wall of horn, may be welded. There is no limitation in length or depth of cracks that may be welded. This rule does not permit the welding of parts of different couplers to form a complete unit for application to cars in interchange service.

(2) Cracks in guard arm and front face of coupler, including cracks extending full length of face, into lock opening and into top and bottom wall, may be welded. If crack is open more than 1/16 in., parts shall be pressed back to original contour before welding is done.

(3) Cracks in knuckle side wall may be welded provided they do not extend beyond the shaded area shown in Fig. 9, Sec. B. A broken out section within this area not exceeding 3 inches in any direction, as indicated in Sec. (C) of Rule 18, may be repaired by welding in a piece of proper shape and thickness.

(Present Fig. 9 will be eliminated and replaced with Fig. E-1 as shown on page 100 of the 1946 Interchange Rules.)

(4) Couplers having 5-in. by 7-in. shank with 6½-in. butt may be converted to 9⅛-in. butt by welding metal shims on top and bottom of butts in accordance with the following regulations:

1—Shims should be cut to proper size—1 5/16 by 5 by 5½ in.

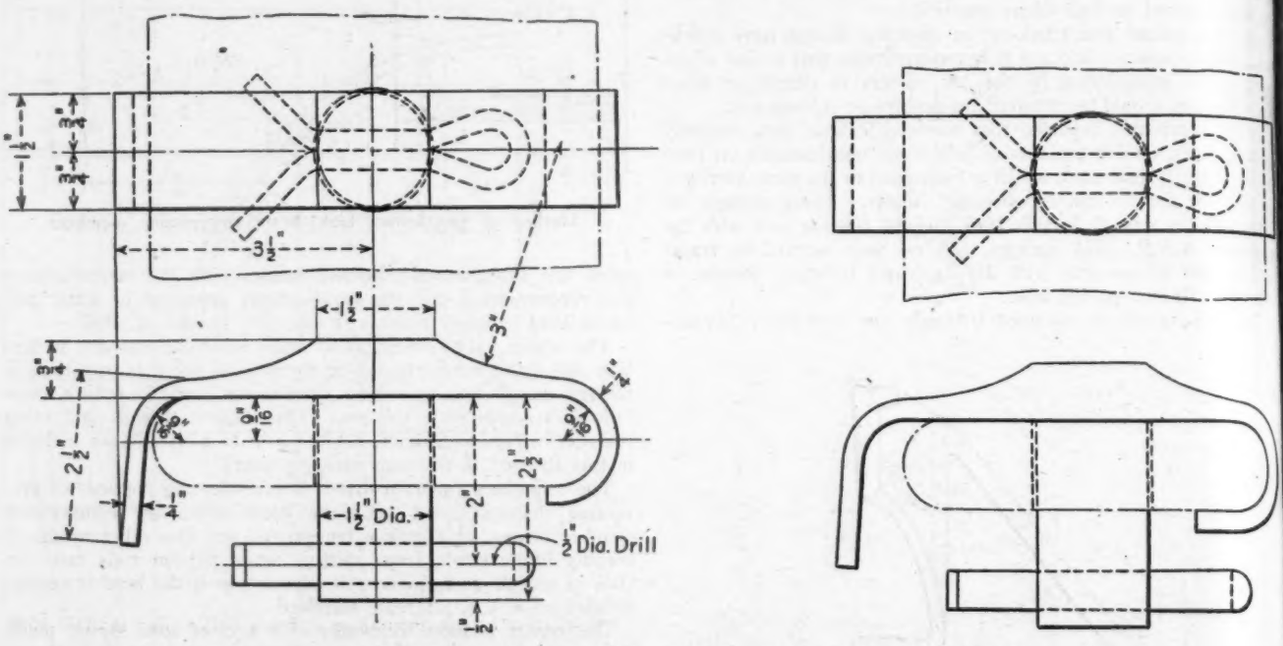
2—Drill shims in pairs to match holes in related coupler butts.

3—Grind coupler butts to give neat seating of shims.

4—Bevel shims ⅜-inch at 60-deg. angle (or give J weld preparation) all around contact face. No beveling of coupler butt permitted.

5—Tighten shims to welding position on coupler butt by dummy pin and key, and exercise care to see that shim edges are flush with corresponding edges of coupler butt.

6—After shims are thus in position, weld to coupler butt by the shielded-arc electric method.



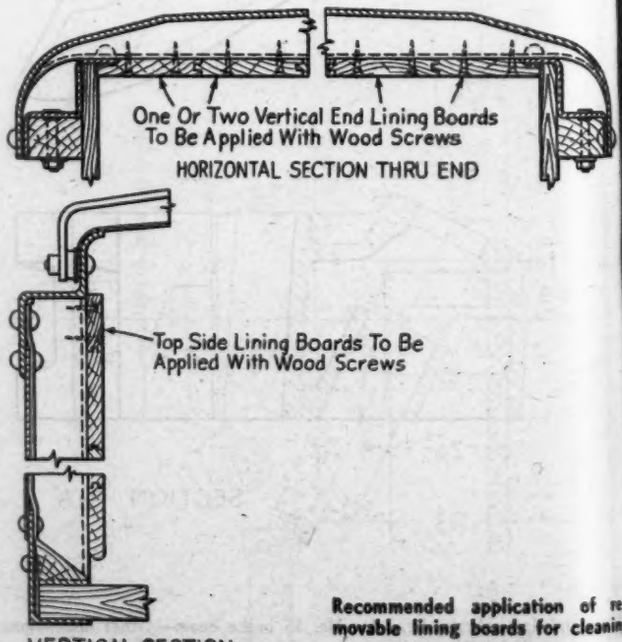
Proposed draft-key retainer applied to 6-in. key (left) and 5-in. key (right)

7—All sharp corners of applied shims must be removed by grinding. (See Fig. 16—formerly Fig. E-3 in Emergency Regulations.)

Cast-Steel Yokes

(1) Cracks in straps, not closer than 3 in. to junction with rear of yoke, may be welded regardless of extent or direction of crack. If crack stands open, means must be used to hold the severed ends in proper relation while welding so that the length of the strap is not changed.

(2) Cracks anywhere in front section of yoke, including key-slot, may be welded.


One Or Two Vertical End Lining Boards To Be Applied With Wood Screws
HORIZONTAL SECTION THRU END
Top Side Lining Boards To Be Applied With Wood Screws
VERTICAL SECTION

Recommended application of removable lining boards for cleaning purposes

(3) Cracks in rear end of yokes, including 3 in. of adjacent strap, must not be welded. (See Fig. 15—formerly Fig. E-2 in Emergency Regulations.)

Height of Couplers and Buffers

Passenger Car Interchange Rule 7, Sec. (g), Para. (3), now requires that the same coupler heights and adjustments as specified in Para. (e) of Freight Car Rule 20 apply to other than passenger-carrying equipment cars. It is not practical to permit the same variations in heights of couplers in load-carrying passenger equipment cars as in freight cars, and your committee has been requested to submit a proposed revision of P.C. Rule 7 to agree with established and logical practices, and to include suitable instructions goveruning the heights of buffers.

The committee does not consider it proper to establish limits governing the heights of buffers independent of coupler heights, as no means are usually provided for shimming of the buffers only, the heights of buffers being predicated on the coupler heights.

The committee submitted as a new section to take the place of Sec. (g) of P.C. Rule 7 which, if approved, will be submitted to letter ballot.

Insect Infestation of Box Cars

Shippers of flour and cereal products have directed attention to the fact that no provision is made on the A.A.R. drawings for properly cleaning behind side and end linings of box cars. Accumulation of materials behind linings makes an ideal place for breeding of insects which infest shipments of flour and cereal products carried in these cars.

The shippers request that these places be made accessible for cleaning and removal of such accumulation and insects before cars are loaded.

Drawing has been prepared to show top side lining boards on both sides of cars and one or two end lining boards on each side at both ends of the car applied with screws to permit the easy removal of the boards for cleaning behind them with compressed air.

The report listed 23 specific items recommended for submission to letter-ballot and also included a complete record of revision sheets for the Supplement to the Manual.

(The report was accepted and necessary recommendations ordered referred to letter ballot.)

Report of Committee on Geared Hand Brakes

Number of designs limited to 16—Lubrication schedules and grease specifications proposed

[The members of the Committee on Geared Hand Brakes are: R. G. Henley (chairman), general superintendent motive power, N. & W.; E. P. Moses, engineer rolling stock, N. Y. C. System, and J. P. Lantelme, general foreman, Penna.]

R. G. Henley
Chairman

In initiating the program for the certification of geared hand brakes two major objectives were in mind, one was the combination of the features of ample braking power, sturdy construction and convenience of manipulation; the other purpose was to reduce insofar as possible, the number of different brakes of a type that would be subject to interchange handling.

As of May, 1946, a total of 12 vertical-wheel type geared hand brakes and 4 horizontal-wheel type have been tested and approved. Other applications have been received for which tests are being arranged. In order to better control the number of approved brakes through this procedure, the number of hand brakes of each type from any one manufacturer must necessarily be limited and this feature is being carefully watched as applications are received.

Revision of Specifications

In providing for the testing of horizontal-wheel geared hand brakes it was necessary to make some changes in the laboratory procedure from that followed in the handling of the vertical type brake. This change was of such a character as to require revision of the specification for horizontal-wheel brakes. The suggestion for this alteration was contained in letter ballot Circular DV-1096 which is now in the hands of the Association for consideration.

There are certain designs of small groups of special cars where, due to the construction, none of the approved designs of geared hand brakes can be used. To provide for such cases it is proposed to include a provision that, in such cases, brakes applied shall meet requirements of the specification and, after A.A.R. test and approval, be marked AAR-1942-S (the letter S to signify Special). Such special designs will not be listed among the types approved for unlimited application and will not be accorded the same consideration as regular approved types in interchange accounting, substitutions, etc.

If this provision is approved, Interchange Rule 3 will require modification to provide for the application of such brakes to new cars. This will be referred to the Arbitration Committee.

It is recommended that the specifications for geared hand brakes be revised, for identification purposes, to specify that all approved brakes must be plainly stamped or have cast on the face of the casing the symbol "AAR-1942" in letters at least ¾ in. in height.

Periodic Lubrication

It is recommended that A.A.R. Interchange Rule 61 be changed to make the lubrication requirement mandatory by deleting the words "if necessary". By such means, all geared hand brakes will be lubricated at least every three years.

To conform with such a lubrication program the lubricants to be used should be specified, and the following is suggested:

Hand brakes where oil lubrication is applied: Any good grade of car oil.

On hand brakes where Alemite or similar fittings are provided for the application of grease, a grease conforming to the characteristics in table I should be used.

Table I—*Characteristics of hand brake grease*

Soap (calcium), per cent	12
Graphite, per cent	12
Mineral oil, per cent	72
Water, fatty acids and free alkali, per cent	4
Penetration	300 to 335
Melting point, deg. F.	200+ or 5

Champion brakes (vertical type) Drawings 1148 and 1124, and Superior brake (vertical type) Drawing 566, and horizontal types Drawings 603-D and 668-A, are equipped with Oilite bearings and oil lubrication may be applied if desired.

Credit Allowance

There has been referred to the committee a subject that has been before the Arbitration and Price Committees relative to recommending an average credit allowance for defective (or inoperative) geared hand brakes removed on foreign lines.

Observations indicate that where it is the practice to have defective hand brakes returned, the condition of such brakes varies over a wide range; therefore the committee does not consider any credit that might be established would be a fair representation of the value of the brakes. It would be of value to owners making a practice of having hand brakes returned, if the handling line was required, through a revision of Interchange Rule 17, more definitely to indicate the condition of the disabled hand brake when reporting them to the owner. This is offered as a suggestion to the Arbitration Committee.

It is the opinion of this committee that where car owners are interested in reclaiming geared hand brakes removed from their cars on foreign railroads, Interpretation B-5 of Interchange Rule 17 provides the most reasonable and equitable means of handling.

Summary of Recommendations

It is recommended that the following items be referred to letter ballot:

1—That manufacturers of geared hand brakes be limited to four designs of vertical-wheel type, two designs of horizontal-wheel type and two designs of ratchet type.

2—That the specifications be revised to recognize certain special designs of geared hand brakes where existing standards will not apply and that such special designs be properly identified by the marking "AAR-S-46", and will be acceptable on cars in interchange, but will not be accorded the same consideration as the standard designs.

NOTE.—In conjunction with this change, it is understood Interchange Rule 3 will be modified to provide for the application of such special designs of brakes to new cars.

3—That the specifications be revised to require on approved hand brakes the symbol "AAR-1942" either in steel stamped letters at least ¾ in. high or with the symbol to be cast on the housing.

4—That A.A.R. Interchange Rule 61 be modified to make mandatory the lubrication of geared hand brakes at air-brake cleaning periods.

5—That the lubricants to be used for geared hand brakes should be in conformity with the characteristics outlined in this report and adopted as recommended practice.

(*The report was accepted.*)

Report of the Committee on Tank Cars

200 applications for approval of designs and 103 applications for alterations in, additions to, or conversions of tank cars—No formal meetings held

[*The members of the Committee on Tank Cars are: F. Zeleny (chairman), engineer of tests, C. B. & Q.; R. D. Bryan (vice-chairman), mechanical assistant, A. T. & S. F.; W. C. Lindner, motive-power inspector, Penna.; A. G. Trumbull, general mechanical engineer, C. & O.; L. R. Schuster, engineer car construction, Sou. Pac.; L. R. Christy, superintendent car department, Mo. Pac.; D. S. Clark, administrative assistant to head, School of Mechanical Engineering, Purdue University; J. J. Root, Jr., vice-president, Union Tank Car Co.; R. T. Baldwin, secretary, The Chlorine Institute, Incorporated; H. J. Gronemeyer, supervisor car equipment, E. I. du Pont de Nemours & Co., Inc.; R. W. Thomas, manager, chemical products department, Phillips Petroleum Co., and G. W. Thomas, master car builder, Deep Rock Oil Corp.*]

F. Zeleny,
Chairman

During the past year the committee was called upon to give consideration to 200 dockets and applications for approval of designs as follows: Seventy-three covered designs, materials and construction of 1,348 new shipping containers, for mounting on new cars or for replacement on existing cars; three covered the construction of 14 multiple-unit cars to be used for the transportation of 15 Class ICC-106A500 type one-ton containers each; one covered the construction of one new car structure for the mounting of an existing Class ICC-103-A tank-car tank; and 103 covered alterations in, additions to, or conversions and reconditioning of 2,557 existing tank cars or shipping containers.

Substitutes for Tank Cars

Due to the shortage of tank cars during the war emergency several expedients were resorted to. Among these were the following:

B. & O. box car 390000 equipped with four steel-lined wooden tanks and the necessary fittings for loading and unloading, and assigned to Diesel oil service between Baltimore, Md., and Washington, D. C., was first loaded February 23, 1943, and made a total of 88 trips with loads ranging from 9,777 to 12,416 gallons, the majority closely approximating 12,000 gallons. Its last trip was made September 11, 1945. Standard tank cars then being available, tanks and fittings were removed on November 1, 1945, and this car restored to regular service.

B. & O. box car 390050 equipped with five corrugated steel tanks, having a total capacity of 12,500 gallons and fittings required for loading and unloading, was assigned to Diesel-oil service between Canton, Md., and Washington, D. C. It was first loaded on May 6, 1943, made a total of 56 loaded trips, and, after removal of tanks and fittings, was restored to regular service on March 6, 1945.

L.C.L. Corporation air-activated cement containers were regularly handled on gondola cars equipped with fittings to prevent shifting or rotation of the containers in transit. After being altered, 116 car sets of containers were placed in service assigned to the handling of fuel oil and other petroleum products having a flash point above 80 deg. F. Seventy-four of the cars used mounted five containers each, with an aggregate capacity of 9,700 gallons per car, and 42 cars accommodated six containers, with these providing a capacity of 11,166 gallons per car. These cars were assigned to service between Destrehan, La., and Chelsea, Mass. For the period for which they were used they transported and delivered approximately 1,520,000 gallons of fuel oil per month. Their last loading was in August, 1945, after which the containers were reconverted for use in their normal service.

Only minor difficulties were encountered in the use of any of the substitutes mentioned while they were used for transporting petroleum products.

Changes in I. C. C. Regulations

Upon recommendation of the committee, concurred in by the Bureau of Explosives, the Interstate Commerce Commission authorized the equipping, for experimental purposes, of a total of 25 specification ICC-103-B tank cars with porous carbon-cylinder safety vents. Upon further recommendation of the committee, concurred in by the Bureau of Explosives, and following the satisfactory completion of 270 trips, the Commission authorized amendment of specification ICC-103-B and ICC-103B-W to provide authority for equipping cars of these classes, without limit except for lading services indicated, with safety vents of the porous carbon-cylinder type.

Following a report received from builders of specification ICC-106A500 forge-welded ton containers of their inability to secure forge-welded barrel sections, accompanied by recommendation that this specification be amended to authorize barrel sections of ton containers to be fabricated by fusion welding, it was agreed there was necessity for modification of the specification as proposed. The recommendations of the Committee, concurred in by the Bureau of Explosives, were presented to the Commission. By order dated April 19, 1946, the Commission amended its specifications 106A500 to authorize the further use of fusion welding as proposed in the construction of tanks of this type, and requiring that any having fusion welded longitudinal joints in the barrel sections be steel stamped ICC-106A500X. The General Committee has approved modification of A.A.R. requirements of A.A.R. Tank Car Specification ICC-106A500, to supplement the I.C.C. amendment of its specification, to provide details not inconsistent with I.C.C. requirements.

While the committee as a whole has held no meetings since its report of June 12, 1945, its members have been called upon frequently to serve on numerous subcommittees. These members' reports and recommendations have been extremely helpful to the Committee in disposing by correspondence of the various proposals, applications and dockets requiring its attention.

(*The report was accepted.*)

Report on Specifications for Materials

Withdrawal of certain piping and high-chrome steel specifications recommended—Separation of carbon and carbon-silicon steel specifications recommended

[*The members of the Committee on Specifications for Materials are: T. D. Sedwick (chairman), engineer of tests, C. R. I. & P.; H. G. Miller (vice-chairman), mechanical engineer, C. M. St. P. & P.; C. B. Bryant, chief engineer, Technical Board, Wrought Steel Wheel Industry; F. Zeleny, engineer of tests, C. B. & Q.; H. G. Burnham, engineer of tests, Nor. Pac.; H. P. Hass, director of tests and research, N. Y. N. H. & H.; J. R. Jackson, engineer of tests, Mo. Pac.; L. B. Jones, engineer of tests, Penna.; W. R. Hedeman, engineer of tests, B. & O.; W. F. Collins, engineer of tests, N. Y. C.; W. Bohnstengel, engineer of tests, A. T. & S. F., and R. McBrian, engineer standards and research, D. & R. G. W.*]

T. D. Sedwick,
Chairman

The committee reviewed all of the A. A. R. material specifications, and as a result of this review submitted the following recommendations as to changes and revisions:

The committee recommended that the present specifications M-111, and emergency specifications EM-111, for furnace welded, electric resistance welded and seamless steel pipe, be rescinded from the Manual, and replaced with a sheet to the effect that the A. A. R. requirements for this material are to be covered by A. S. T. M. specifications: A-53 for Welded and Seamless Pipe, A-135 for Electric Resistance Welded Pipe, and A-120 for Black and Hot Dipped Zinc Coated (Galvanized) Welded and Seamless Steel Pipe for Ordinary Use. This action was recommended as railroads are comparatively small users of this type of pipe, and it would be to their commercial advantage to follow along with general accepted standards.

The committee recommended that the following change in specifications M-114, sec. 16(a), for carbon steel helical springs be submitted to letter ballot: Proposed Form—The ends of the bars shall be properly tapered to give *the finished springs at each end* a firm bearing, *which shall be square with the axis of the helix within 3/8 in. per foot of free height.* The points of the bar shall be in approximate contact with the adjacent coil and shall not protrude beyond the outside diameter of the springs.

(Specification M-115-45 for carbon and carbon-silicon steel for boilers and fireboxes for locomotives, stationary boilers, and other pressure vessels has been recommended for revision by separating this specification into M-115-46 for carbon steel, and M-128-46 for carbon-silicon steel. The two revisions recommended to be submitted to letter ballot are shown as Exhibit B and Exhibit C respectively. These two exhibits, along with Exhibit A, and D to G, incl., prepared by the committee are not included in this abstract.—*Editor*)

The committee recommended that Specifications M-125-44, for machine bolts and nuts be revised so as to bring the requirements into conformity with present practices of the manufacturers and type of product being produced, and that the revised specifications M-125-46, Exhibit D, be submitted to letter ballot.

Forgings

Editorial changes have been approved by the committee in the following sections of Specifications M-126-45 for carbon steel forgings, and are recommended to be made in the next printing of these specifications: Sec. 5 (a), Sec. 13 (a) Table III, Sec. 15 (c), and Sec. 16 (a).

Editorial changes have also been approved to be made in the next printing of Sec. 6 (b) and Sec. 13 (a) of specifications M-127-45 for alloy steel forgings. A new section, 6 (c), has been added, and reads as follows:

In bored forgings, the diameter of the holes shall be a matter of agreement between the manufacturer and the purchaser. In order to provide adequate quenching, the diameter of the hole shall be not less than 20 per cent of the outside diameter of the forging.

High-Chrome Steel

(Four specifications for the use of high-chrome steel in nitric-acid tank cars were recommended by the committee for withdrawal from Sec. A of the manual in their entirety because of the very limited amount of construction of cars using these alloy materials. The specifications to be submitted to letter ballot are: M-151-29 for rivet material, M-152-29 for tubing, M-153-29

for tank plates, and M-251-29 for castings for valves. The members of the Tank Car Committee concurred in this recommendation.—*Editor*)

Miscellaneous Material

Modifications of the requirements of the 1945 issue of specifications M-201-45 for steel castings have been approved by the Committee and are being attached, identified as Exhibit E, with recommendations that they be submitted to letter ballot.

The committee recommended that revised Specifications M-306-38 for welded wrought iron pipe bringing the requirements in conformity with present day practices, attached to this report, identified as Exhibit F, be submitted to letter ballot.

Revised specifications M-605-38, and EM-605-44 for Steam and Hot Water Hose have been prepared and approved. The committee recommended that the emergency specifications EM-605 be rescinded and revised specifications M-605-46, attached to this report as Exhibit G, be submitted to letter ballot.

Discussion

Howard Lanning, A. T. & S. F., called attention to that part of the report covering firebox and flange steel and said that the maximum allowable percentage of copper is too high and may cause trouble due to cracking of flanges. He said that both copper and residual alloys should be further restricted. Mr. Lanning also objected to the tables on pages 10 and 17 of the committee report showing the maximum permissible overweight in plate thicknesses which will tend to prevent building locomotive boilers large enough to meet modern requirements and yet keep within necessary weight limitations.

(*The report was approved except for the three items mentioned and necessary recommendations referred to letter ballot.*)

Report of Committee on Couplers and Draft Gears

Draft-key wear limits and welding practices recommended—Tests conducted to increase yield and ultimate strength of knuckles—Tests run on gears made in Canada

[*The members of the Committee on Couplers and Draft Gears are: H. W. Coddington (chairman), research and test engineer, N. & W.; H. W. Faus (vice-chairman), engineer motive power, N. Y. C. System; N. T. Olsen,*

H. W. Coddington,
Chairman

principal mechanical engineer, C. & N. W.; F. T. James, chief motive power, D. L. & W.; W. Bohnstengel, engineer tests, A. T. & S. F.; C. K. Steins, mechanical engineer, Penna., and B. Faughman, assistant works manager, Angus shops, Can. Pac.]

The committee has held one meeting during the year, which included a joint session with the Mechanical Committee of Standard Coupler Manufacturers. Subjects which have received consideration of the committee, together with recommendations in connection therewith, are shown in this report.

Draft-Key Wear Limits

Upon request for establishing a limit for wear on horizontal draft keys, the committee is making recommendation to the Arbitration Committee that a new requirement be included in the appropriate Interchange Rule specifying that horizontal draft keys must be removed from service when wear on the edge that contacts the coupler and/or the coupler yoke amounts to 5/16-in. This limit is suggested as it brings the condemning limit within the range where the key can be satisfactorily reclaimed by the reforging method as outlined in the 1940 and 1941 reports of the committee.

Quenching Draft Keys

The general practice followed on most roads is to forge and quench draft keys to increase their hardness and wear resistance properties, although some railroads consider it advantageous to eliminate the quench and thus reduce the hardness and take the wear on the key rather than on the more inaccessible parts of the draft gear attachment.

This proposition was discussed at the last meeting and the Secretary was instructed to request three roads represented on this committee to make application on a group of cars that can be closely observed, applying the draft keys "as-forged" on one end of each car, and "forged and quenched" on the opposite end, making a record of the relative Brinell Hardness of the keys and observing the manner in which the wear develops on the keys and contacting parts. The committee will follow this procedure and report the results.

Type D Couplers

Attention has been called to top-operated Type "D" couplers inoperative on account of the lock lifter dropping too far into the coupler head. Suggestion as to the use of an open link around the lifter to prevent it from dropping too low was considered. This practice would serve the purpose as an emergency measure, but was not looked upon with favor as there would be too great a tendency for the coupler in a defective condition to be continued in service with this emergency correction.

The manufacture of Type D knuckles was discontinued in 1932, but Type D bars were manufactured until discontinuance in 1934. During those two years, new Type D bars were fitted with Type E knuckles. During the 14 years the Type D knuckles have been out of production, replacements have been made with the Type E knuckle which, on account of the lock resting on the knuckle tail shelf, prevents the dropping of the lock lifter as has been experienced with the old Type D coupler and knuckle. It is essential that the Type D coupler be fitted with the No. 3 top lock lifter or modified No. 2 top lock lifter to complete the correction.

Improper Welding

It has been brought to the attention of the committee by a member road that trouble is being experienced on account of train separations due to improper practice in welding and building up worn surfaces on knuckles and locks.

This condition is being found on cars of ownership where such reclamation practice is not followed and shows that these im-

properly reclaimed parts are being applied while the equipment is on foreign lines. Investigation is being made of this situation on the road making complaint, but developments are not available at this time for further report.

Rotor Lever Assembly

Mention was made of a proposed articulated rotor lever assembly for A. A. R. Type E couplers in the 1945 report and, while some of the installations referred to have been completed and the equipment is in service, there have been no developments to date, worthy of comment at this time, other than the program is being carried out as originally outlined.

Yield Strength of Knuckles

The Standard Coupler Manufacturers Mechanical Committee under the supervision of the Coupler Committee completed a program of tests on type E-50 knuckles and type E-40 locks of Grade B steel normalized, of high-tensile steel normalized and tempered, and of high-tensile steel quenched and tempered; and of type H-50 Tightlock Knuckles and Type H-40 locks of high-tensile steel quenched and tempered. The results of these tests are reported in appendix A.

The results showed the average yield strength of the normalized and tempered high-tensile steel E-50 knuckle to be 45,000 lb. more than the Grade B steel normalized E-50 knuckle, and the ultimate strength to be 20,500 lb. greater. Similarly, the high-tensile steel quenched and tempered exceeded the Grade B steel by 130,000 lb. in yield strength and 142,000 lb. in ultimate strength. The committee considered that the ultimate strength of the high-tensile steel quenched and tempered E-50 knuckle too closely approached the strength of the bar to provide a safe margin between the failure of the knuckle or the failure of the bar. The committee therefore concluded that the high-tensile steel normalized and tempered E-50 knuckle and E-40 lock would best serve to improve the Standard E Coupler. They have status as a standard in specification M-204-39, and were recommended by the committee as a single standard for use in Interchange in place of the Grade B steel knuckle and lock.

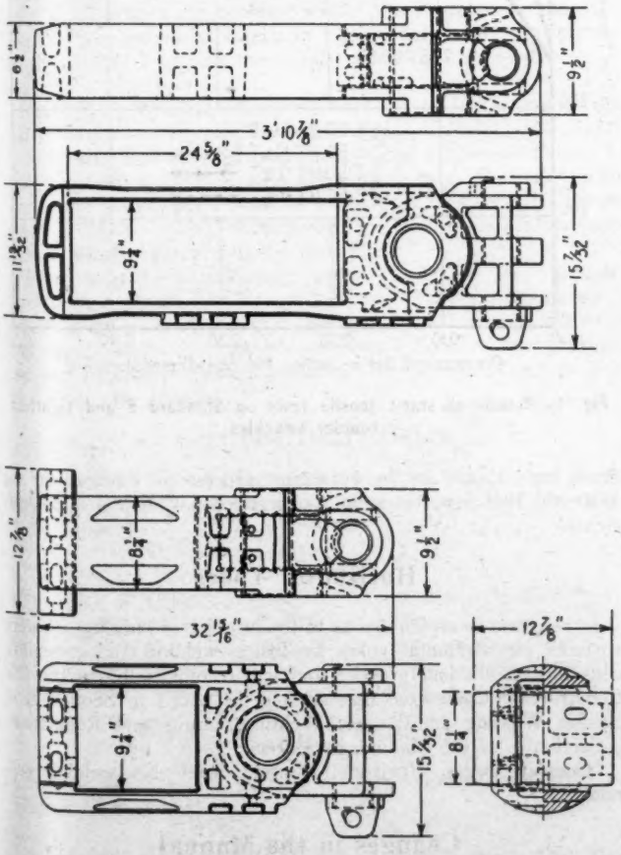


Fig. 1—The top drawing shows yoke with standard pocket for conventional draft-gear application—Bottom drawing shows yoke with standard pocket for twin-draft-gear application

The committee saw no objection to the use of quenched and tempered E-50 knuckles and E-40 locks when desired, principally for use on the higher-powered locomotives, but when such is used in Interchange, the committee recommended against the higher-priced knuckle being protected.

Included in the test program were Tightlock Coupler knuckle H-50 and lock H-40 for the purpose of obtaining a record of the yield and ultimate strengths . The information obtained was included in the test results, but required no action as this knuckle and lock already have Association approval.

Tightlock Couplers

All A. A. R. Type H tightlock couplers manufactured since May 1, 1945, were assembled with the locks seated on the knuckle-tail shelf or not more than ⅛ in. above the shelf. Most railroads having Type H tightlock couplers in service manufactured prior to that date and modified Type T tightlock couplers are refitting the locks so that the lock will either seat on the knuckle tail shelf or not over ⅛ in. above the shelf. This change in manufacturing practice and the modifying of tightlock couplers in service eliminates the possibility of locks sticking, thus permitting the use of the No. 6 operating mechanism, providing for operation from the left-hand side of the car only. This change will not only reduce the cost of the operating mechanism by approximately one-half, but will simplify the application of couplers and rods by eliminating complications encountered because of brake and signal line locations.

This suggested change in the operating mechanism need apply only to new construction and to T type tightlock couplers that have been modified to the improved anti-creep arrangement in accordance with Standard Coupler Manufacturers Mechanical Committee's Circular 942-A.

The No. 6 tightlock coupler mechanism is shown in application and detail on Plate C, Page C-76 in the Manual. It is recommended that a note be added on this Plate to read as follows:

"When it is desired to operate the coupler from the left side of car only, Items H-17, H-19 and H-20 and the uncoupling rods lock lift end and handle end as shown on the right side of the assembly should be omitted."

Short Yoke Arrangement

Mention was made in the 1945 report that consideration was being given to the design of a short coupler yoke for use with A. A. R. tightlock coupler and twin-cushion draft gears which could be applied to passenger cars having Standard A. A. R. 24⅝-in. length draft-gear pocket.

This design has been completed and physical tests conducted by the Mechanical Committee under the supervision of the Committee on Couplers and Draft Gears. Attached to the report as Appendix B is a complete record of the physical tests made by the Mechanical Committee under the supervision of the Committee on Couplers and Draft Gears of the proposed short yoke. The results of the test were satisfactory in every respect and your committee is recommending that this yoke identified as Catalog No. Y-65 be adopted as Alternate Standard and an alternate to yoke Catalog No. Y-50 and a substitute for yoke Catalog No. Y-60, which design should be discontinued except for maintenance purposes.

This new design yoke Catalog Y-65, also yoke Catalog Y-50 and attachments are shown as Fig. 1 and if adopted by letter ballot, will replace Plate B on Page C-75 of the Manual of Standard and Recommended Practice.

Yoke Improvements

Improvement has been made in the shank-pin retaining key for the vertical pin to prevent this key working out and releasing the vertical pin which is applied from the bottom. The design of the improved shank retaining key is shown in Fig. 2. These improvements include a new design of key as well as a modification in the yoke to provide for application of the key.

Fig. 3 shows the change that is necessary to existing yokes now in service to provide for application of the new shank-pin retaining key. These changes have been studied by the committee and are considered a marked improvement over the present design. The necessary gages for the key and the yoke

have been designed and, along with the design changes, are recommended for letter ballot approval as a part of the A. A. R. tightlock coupler standard attachments.

Type H Tightlock Coupler

Since the Type H tightlock coupler, attachments and gages identified as A. A. R. Tentative Standard, has passed the development stage and is rendering satisfactory service it is the

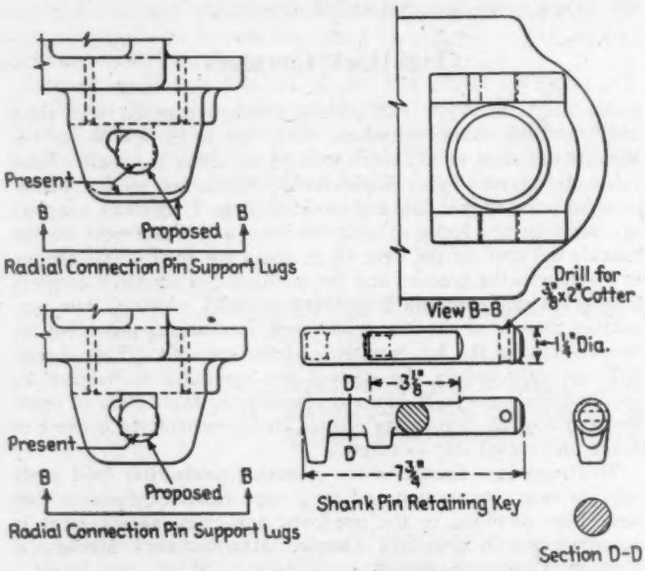


Fig. 2—Proposed changes in the radial connection to provide for application of new shank-pin retainer key

recommendation of your committee that letter ballot item be prepared advancing the Type H tightlock coupler, and attachments and gages to A. A. R. Standard.

Tightlock Coupler Reclamation

It was anticipated that the committee would have definite recommendations to include in this report relating to reclamation of tightlock couplers. While it was not possible to have these recommendations available at this meeting, it is thought in the course of a few weeks this subject will be developed to where an A. A. R. circular covering tightlock coupler maintenance will be prepared and distributed to the membership.

One of the greatest needs for maintenance on tightlock couplers is a method for compensating for wear on the bottom surface of the shank where it contacts the carrier. In the 1945 report, the committee showed an approved method of applying a

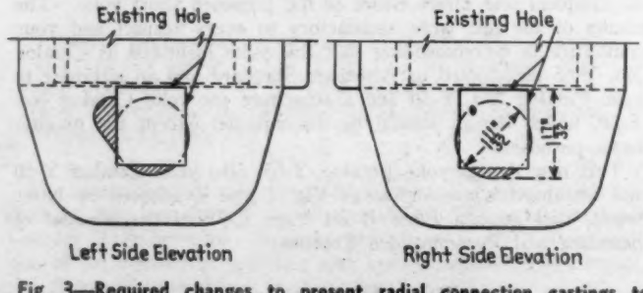


Fig. 3—Required changes to present radial connection castings to permit application of new retaining key

spring steel plate to this worn section after proper machining, which method will be included in the maintenance circular to be issued.

Proposed Freight Coupler

Advancement in the develoment of this coupler has been retarded by the war effort, but some progress has been made during the year by the Standard Coupler Manufacturers from the standpoint of design refinement of the coupler and attachments. The design work has now reached a stage where it is to be reviewed by the Mechanical Committee of the Standard Coupler Manufacturers, and a joint subcommittee representing the Car Construction Committee and the Coupler Committee.

Coupler Failures

At the last meeting of the Coupler Committee, recommendation was made to the Arbitration Committee that further extension be granted in the effective date of Rule 3 prohibiting acceptance from owners of cars with 5-in. by 5-in. shanks and cars equipped with former standard (except type "D") or temporary standard 5-in. by 7-in. shank couplers to January 1, 1948. January 1, 1948 is recommended as there seems no possibility of such a change being accomplished by January 1, 1947.

Welding

Consideration was given to a request that permission be granted for welding up worn surfaces on draft keys by fusion welding. The committee does not concur in this suggestion and supports the recommendation of the Car Construction Committee that a new paragraph be added to Section B of Interchange Rule 23, to read as follows and submitted to letter ballot:

"Draft Gear Keys—No welding permitted. Reclamation of

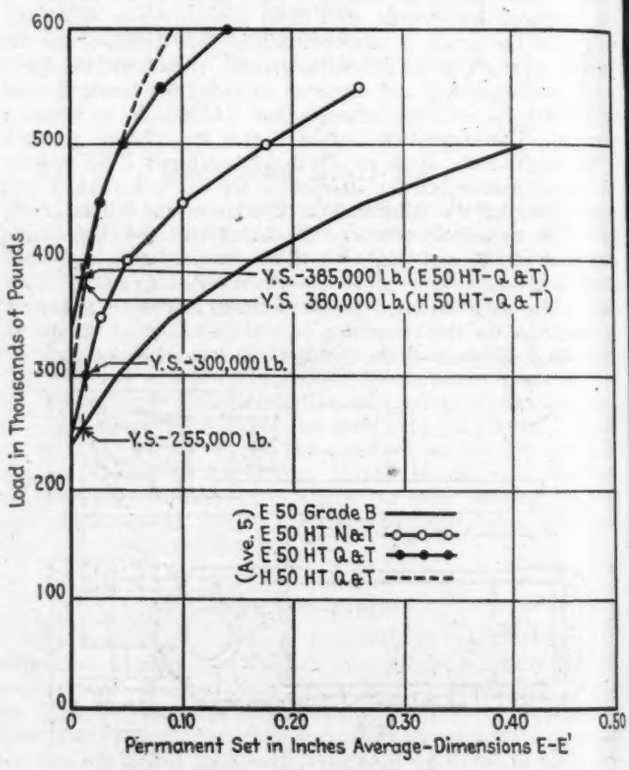


Fig. 4—Results of static tensile tests on Standard E and tightlock coupler knuckles

draft keys should be by reforging process as outlined in the 1940 and 1941 reports of the Committee on Couplers and Draft Gears."

Horizontal Yokes

In response to an inquiry as to the practice of building up worn surfaces on horizontal yokes by fusion welding, the committee considers this a bad practice and has recommended to the Car Construction Committee that an item be added to Section B of Fusion Welding and Bronze Welding, Limits and Regulations —Section L of the Manual, as follows:

"Coupler Yokes, Horizontal Forged Steel—No welding permitted."

Changes in the Manual

It is recommended as a letter ballot item that Manual Pages L-63, L-64 and L-65, showing Recommended Practice Method

of Reclaiming Swivel Shank Couplers, be removed from the Manual on account of the subject being fully covered by Paragraph 1(h) Coupler Reclamation Practices, of the Standard Specifications for Secondhand Couplers, Manual Page C-66, also by Fusion Welding and Bronze Welding, Limits and Regulations, shown in Manual Section L and Interchange Rule 23.

Coupler Maintenance and Reclamation

The committee wishes to voice approval of the recommendations being presented by the Car Construction Committee relating to Fusion Welding and Bronze Welding, Limits and Regulations in Section C of Rule 23, and to be also included as section C of the Recommended Practice in Manual Section L, together with certain other revisions recommended in these limits and regulations.

In connection with recommendation being made by the Car Construction Committee for revision of rules and practices relating to maintenance and reclamation of couplers and coupler parts, the committee recommends that the Specifications for Secondhand Couplers for Repairs to Freight Equipment shown on pages C-69—C-72 of the Manual be revised as follows:

Par. 2(b) under "Inspection and Gaging": Proposed Form: Couplers must be entirely free from cracks, excessive wear, corrosion and porosity, or welds not performed strictly in accordance with the practices covered by *Fusion Welding and Bronze Welding Limits and Regulations, Section L of the Manual.* For inspection purposes the couplers shall be thoroughly cleaned to remove all paint, dirt, excessive rust, etc.

Paragraph under "3. Marking": Proposed Form: Secondhand couplers having body reclaimed by welding must be stamped with the railroad's initials followed by date reclaimed, in the location shown in Figure 1, page C-69. (This stenciling on secondhand couplers should not be confused with the marking required on couplers welded in the knuckle side wall *as covered by Paragraph 7, Section A, Fusion Welding and Bronze Welding Limits and Regulations shown in Section L of the Manual and Interchange Rule 23.*)

Paragraphs 1(e) and 1(f) under Appendix "A," Coupler Reclamation Practices: Proposed Form: Knuckle Sidewall Cracks—Couplers with cracks in the knuckle side wall of the head may be reclaimed by *the shielded electric arc welding process only,* if all cracks are confined within the shaded area shown in Fig. 5. The markings shown in Fig. 5 shall be legibly stamped on the welded area and the coupler shall then be normalized in accordance with Section 8.

Guard Arm Cracked—Couplers with cracks in the guard arm *and front face of coupler, including cracks extending full length of face, into lock opening and into top and bottom wall, may be welded by the shielded electric arc process only. If crack is open more than 1/16 in., parts shall be pressed back to original contour before welding is done.* After welding, the coupler shall be normalized in accordance with Section 8.

Paragraph 8—Normalizing, under Appendix "A," Coupler Reclamation Practices: Proposed Form: Where normalizing is specified, such heat treatment shall *comply with paragraphs 6(a) and 6(c), Section A of the Recommended Practice Fusion Welding and Bronze Welding Limits and Regulations shown in Section L of this Manual.*

Certified Draft Gears

The number of certified draft gears still stands at twelve, three of which are conditionally approved. All of these are listed below:

APPROVED

Edgewater B-32-KA
Miner A-2-XB, Cylinder D-7940
Miner A-22-XB, Cylinder D-7935
National M-17-A
National M-50-B
Peerless H-1-B
Waugh-Gould 403
Westinghouse NY-11-F
Westinghouse NZ-11-F

CONDITIONALLY APPROVED

Cardwell M-25
Hulson-Clark 150-B
Waugh-Gould 410

Conditional approval is given to new types of gears which have met all specification requirements for approved gears but which have not yet had a sufficient record of satisfactory performance in service to warrant unconditional approval.

Waugh Twin-Cushion Gears

This gear for freight service, type WM 4-6, which has met all A. A. R. specification requirements for approved draft gears for freight service and is designed to fit in the standard draft gear pocket, has so far received only limited approval for use in interchange service. The application of a total of 3900 car sets has been authorized to date. The reason for this limitation is that this gear differs in several fundamental respects from the conventional friction draft gear. Careful initial measurements were taken of a few of the earliest applications and these cars are being brought in periodically for inspection and tests of the draft gears. Four of these gears which were applied to Armour stock cars in 1940 and 1941 were removed and tested recently. These tests at the A. A. R. Laboratory disclosed that these gears were in good condition, had increased from 1 to 5 per cent in capacity, and showed about the same cushioning characteristics as before application. Each gear was reapplied for a further period of service.

Since one of the widely accepted characteristics of rubber is that it retains its resilient properties better when it is "worked" more or less constantly, the committee considered it advisable at the outset to find out what would happen to this cushioning device on a freight car that might be stored for a prolonged period. Under such circumstances the rubber would be under constant and unrelieved preliminary compression, the condition considered most likely to cause depreciation. Therefore, since 1942 one gear of this type has been kept standing in the laboratory and has been tested for capacity once each month. These successive tests have shown practically no change in the characteristics of the gear to date. The tests will be continued.

Check of Gears in Service

Our 1944 report contained results of a check test of approved draft gears after five years of service. These tests were made in 1941. During the coming year it is proposed to make another check test of this kind, selecting 10-year old specimens of certified gears that have not been modified during this period. In addition, five-year old specimens of the newer gears will be selected and tested. The results will be reported in due course.

Draft Gears Made in Canada

As previously reported, specimens of all types of certified draft gears manufactured in Canada were selected at random from railroad and car builders' stocks by representatives of the Subcommittee and shipped to the Association Laboratory at Purdue University for check tests. These tests were somewhat delayed, due partly to wartime restrictions, but have now been completed and report has been prepared. Each manufacturer has been supplied with a copy of that portion of the report which relates to his gear and his comments invited. As soon as these comments have been received and considered, the report will be revised if any corrections are necessary and it will then be submitted to the members. Some serious departures from approved standards were found in gears manufactured in Canada, none of the manufacturers being entirely free from criticism in this respect. All manufacturers, however, have shown evidence of their intention to fully meet A. A. R. requirements in the future. As soon as sufficient time has elapsed to enable the manufacturers to take the necessary corrective steps, another check test of new gears will be made and this will be followed by a check test of Canadian gears removed after a period of service.

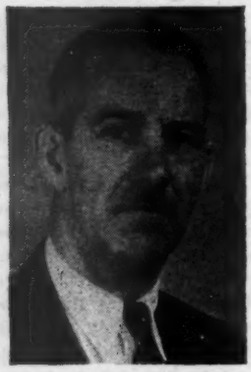
(The report was accepted and necessary recommendations ordered referred to letter ballot.)

THE PRODIGAL TOWEL.—One of the 300,000 lavatory towels, "borrowed" from the Great Western (England) in 1939, has just been returned to the company perfectly laundered. The wrapper bears the inscription—"The need was great—1939." The G. W. R. announces it will be grateful if other "borrowers" of towels, window straps, blinds, electric light bulbs, seat cushions, rugs, and cups will follow suit.

Report of the Committee on Loading Rules

New problems in loading methods expected during the transition from war to peacetime production

[The members of the Committee on Loading Rules are: W. B. Moir (chairman), chief car inspector, Penna.; C. J. Nelson (vice-chairman), superintendent of interchange, Chicago Car Interchange Bureau; H. F. Lyons, superintendent car department, Reading; T. W. Carr, superintendent



W. B. Moir,
Chairman

rolling stock, P. & L. E.; A. H. Keys, assistant superintendent car department, B. & O.; H. H. Golden, supervisor A. A. R. Interchange and Accounting, L. & N.; H. J. Oliver, assistant superintendent motive power (car), D. T. & I.; F. A. Shoulty, assistant superintendent car department, C. M. St. P. & P.; G. D. Minter, division car inspector, N. & W., and F. Fahland, mechanical engineer, U. P.]

The annual report of your committee for the year 1945 covers all matters which have come before the committee since the last annual report was presented to the General Committee in June, 1945. A number of changes in the various rules have been made to provide better and safer securement, past experience having shown this action to be necessary from a transportation safety standpoint.

Your committee prepared a special supplement covering the loading of machinery. It was deemed essential such action be taken in view of the large quantity of machines of various types that would be shipped to all parts of continental North America from plants manufacturing war material after these installations were dismantled at the end of the war. This Special Supplement abrogates the present figures and specifications covering machinery in the Open Top Rules. This pamphlet was published and issued on August 15, 1945, and is effective until rescinded.

Revised or new specifications and drawings covering certain forest products, steel products and automotive products have been prepared and submitted to the industry for concurrence. Anticipating their approval, these revisions and additions have been included in this report.

Since the end of the war, your committee is now faced with the transition period from war to peacetime production of major industry, and we anticipate many new problems in loading methods, which will undoubtedly necessitate further revision in the loading rules to meet the changing conditions.

The following changes in the rules have been approved and will become effective with the next issue of the rules.

General Rules

Rule 4

This rule is revised to read:

(A) The weight of the load on a car must not exceed the load limit stenciled on the car.

(B) When the load is lapped or staggered between truck centers and covers about the full length of the car and the weight of load does not exceed the stenciled nominal capacity of the car, the following tables need not apply.

(C) The weight of material loaded between truck centers and ends of car must not exceed 30 per cent of stenciled limit (i.e. 15 per cent each end).

(D) The percentages of stenciled load weight limits, as shown below, must not be exceeded for loads located between truck centers, measured lengthwise of car, unless car owner has otherwise designated, by note, in the Official Equipment Register that these percentages may be changd.

1. Flat cars with both fish-belly center and fish-belly side sills.

18 ft. or less	75 per cent
Over 18 ft. to truck centers	100 per cent

2. Flat cars not equipped with both fish belly center and fish belly side sills.

10 ft. or less	66.6 per cent
Over 10 ft. to 24 ft.	75. per cent
Over 24 ft. to truck centers	90. per cent

3. Drop-end gondola cars.

18 ft. or less	75 per cent
Over 18 ft. to 24 ft.	87 per cent
Over 24 ft. to truck centers	100 per cent

4. Fixed-end gondola cars.

10 ft. or less	40 per cent
Over 10 ft to 20 ft.	50 per cent
Over 20 ft. to 24 ft.	60 per cent
Over 24 ft. to truck centers	75 per cent

(E) When the length of load is less than the distance between truck centers, and the load is not located in the center of the car, the center of the load weight must not be nearer to either truck center than shown below:

When load weight is reduced to, per cent	Location of center of load weight, between truck centers
40	Any place
50	Any place
60	One-sixth distance
66.6	One-fourth distance
75	One-third distance
87	Three-sevenths distance
90	Nine-twentieths distance

(F) The distance between crosswise bearing pieces (center to center) underlapped or staggered portion must be placed so as to prevent excessive concentration of weight over specified spaces shown in the above tables.

(G) Bearing pieces, lengthwise of car, of suitable strength and length to provide for extended distribution of weight over the specified spaces, shown in the above tables, may be used.

(H) When crosswise bearing pieces are used, the distance between the outside bearing pieces, (center to center) must not be less than the minimum distances specified in the above tables.

Reason: Completely revised and clarified to provide for better understanding.

Rule 5

First paragraph is revised to read: "The weight of load on one truck must not exceed one-half of the load weight limit stenciled on car. In case of doubt, this must be verified by weighing."

Reason: To eliminate cross reference to Rule 4.

Rule 8

Section "B" is revised to read:

"Sufficient clearance must be provided, when loading, to main-

tain 4-in. clearance below overhanging portion of load and any part of idler car which load may contact."

Reason: To clarify the intent.

Section "D" is revised to read:

"When a gondola car is used for an idler, the width of overhang, as shown in Tables 1 and 2, must be reduced by an amount equal to the difference between 12 ft. and the minimum inside width of the gondola car, as per following example:

Length of load (Table 1), ft.-in. 60-0
Length of car used (Table 1), ft.-in. 46-0
Assumed width of car used, ft.-in. 8-9
Arbitrary figure for all loads, Rule 8, Sec. (d), ft.-in. 12-0
Amount of reduction, Rule 8, Sec. (d) =
12 ft. 0 in. — 8 ft. 9 in. = 3 ft. 3 in.
Allowable width of load (Table No. 1), flat car as idler, ft.-in. 7-0
Allowable width of load, Rule 8, Sec. (d), gondola car as idler =
7 ft. 0 in. — 3 ft. 3 in. = 3 ft. 9 in."

Reason: To clarify the intent.

Paragraph "C" is revised to read: "Stakes 4 in. by 5 in. must be tapered to fully fit into and extend at least 4 in. below the stake pockets. Smaller stakes must be tightly secured in the stake pockets, with wedges driven downward into stake pockets and secured to stakes with nails. When no other than the top ties, or none, are used on stakes, the stakes must extend 4 in. below stake pockets, with one 40-D nail driven into the stake directly below and with head even with outside of the stake pocket. When metal stakes do not accurately fit the stake pockets, they must be wedged or built up to fill the pockets; also, secured so they cannot slip through the pocket. Stakes may be placed either in or out of stake pockets on inside of gondola cars with sides 30 in. high or over, provided they rest on car floor and are securely wedged to car sides by lading."

Reason: To again require use of a 40-D nail in bottom of stakes where intermediate cross ties are not used.

Fourth paragraph of Section (b) is revised to read: "Metal fillers sufficient to provide a suitable radius must be used to protect bands and wires at stake pockets, slotted holes in car sides, and at all point on the car or lading having sharp edges."

Reason: To eliminate mention of the definite radius previously specified.

A note is added after Paragraph (e) to read: "To prevent mutilation of cars, exacting efforts must be made to refrain from cutting unnecessary holes or slots, or to confine them to the minimum number and dimensions, required to secure the load."

Reason: To prevent undue mutilation of cars.

A new third paragraph is added to Section (g) to read: "The welding of high tension bands is prohibited."

Reason: To prohibit the welding of high tension bands.

Rule 16

The heading is revised to read: "Loads on One Car Overhanging One End or Both Ends of Car—Length of Material—Width of Overhanging Portion of Load—Allowable Weight of Load. Tables 1 and 2."

Reason: To clarify the intent.

Rule 18

The heading is revised to read: "Loads on Two or Three Cars—Width, Height and Overhand. Tables 3 to 35, Inclusive."

Reason: To clarify the intent.

[The remainder of the report was devoted to new figures, deletions and to the details of revisions made either to the drawings or the text accompanying the drawings. Revisions were made to Figs. 2, 5, 5-A, 6-A, 20, 27, 27-A, 27-B, 29, 30, 32, 35-A, 40-A, 44, 51, 51-A, 52, 63, 63-A, 71-A, 75, 77, 111, 112, 170, 209-B. New Figs. 75-D, 75-E, 206 and 207 were added, the first two figures covering the loading of cable reels and the latter two covering the loading of four-wheel and six-wheel trucks, respectively. Figs. 186, 187 and 188 were deleted because the loading of machinery is covered fully in the special supplement issued August 15, 1945.

In addition the committee listed 22 subjects under consideration which will entail the revision of present figures and specifications or the formulation of new methods of loading. These included four on forest products; eight on steel products; three on farm, wrecking and excavating machines; two on glass products; four on stone, concrete and clay products, and one on automotive products.—*Editor*]

(*The report was accepted.*)

Committee on Brakes and Brake Equipment

Go-and-no-go gauges for air-hose couplings and gauges for AB valve parts are proposed for standard practice

[*The members of the Committee on Brakes and Brake Equipment are: J. P. Lantelme (chairman), general foreman, Penna.; H. I. Tramblie (vice-chairman), air-brake instructor, C. B. & Q.; W. H. Clegg, general superintendent motive power and car equipment, G. T. W.; L. D. Hays, air-brake engineer, N. Y. C. System; D. R. Collins, superintendent air brakes and general road foreman of engines, D. & R. G. W.; R. N. Booker, general air-brake inspector, Sou. Pac.; R. J. Watters, general air-brake inspector, Nor. Pac.; O. H. Swan, supervisor air-brake instruction, U. P.; R. E. Anderson, general air-brake inspector, C. & O.; F. T. McClure, supervisor air brakes, A. T. & S. F.; A. J. Pichetto, general air-brake engineer, Ill. Cen.; and R. G. Webb, superintendent air brakes, C. M. St. P. & P.*]

J. P. Lantelme,
Chairman

Gauges for Air Hose Couplings

Consideration is being given to additional go and no-go gauges and instructions for checking air hose nipples and couplings to supplement the present gauges which do not check with the nipple portion.

The committee recommends that the recommended-practice brake-pipe coupling gauges shown on page B-3 of the Manual be advanced to standard and the drawings modified as shown in Figs. 1 and 2, and that the words "type F" be added in the second line of the title between the words "used" and "couplings"; also that signal hose type H coupling gauges, Figs. 3 and 4, and straight-air line hose type E coupling gauges, Figs. 5 and 6, be submitted to letter ballot for adoption as standard practice. (The illustrations are omitted.—Editor.)

Cleaning, Testing and Lubricating AB Brakes

In response to Circular D. V.—1082, dated February 14, 1945, in regard to cleaning all cars still in service with Experimental AB Brakes: Reports have been received from a number of railroads, but a complete report cannot be made at this time, due to the number of cars not yet reported.

Charging Test for Repair Tracks

Investigation of reports of some cases of brakes not applying on cars equipped with AB brakes was found to be generally caused by excessive charging time. Therefore, it is considered necessary to establish a definite limit for this time which is not specfied in any of the Instruction Pamphlets.

It is recommended that the time limit for charging from 0 to 70 lb. with 70 lb. driving head pressure, for AB brakes on repair tracks, shall not exceed 15 min. and that valves failing to charge in this time be considered inoperative. Providing this requirement is approved by letter ballot it will be included in the A. A. R. No. 5039-4, Sup. No. 1, Instruction Pamphlet, Single-Car Testing Device—Code of Tests.

A number of railroads have made charging tests on AB valves using the 15-min. time limit on cars that have been in service approximately three years since the last air-brake periodic cleaning and report that this time limit would not be objectionable.

Gauges for AB Valves

By direction of the General Committee, a circular letter was issued to the members and private car owners under date of August 10, 1944, specifying the use of six gauges for gauging various parts of the AB valve when taken apart for cleaning or repairing.

It is recommended the use of these six gauges, illustrated in Fig. 1, together with the following instructions for their use, be submitted to letter ballot for adoption as standard practice:

Use of Condemning Gauges for AB Triple Valves

Ring Gauge No. 42004—For checking outside diameters of the service and the emergency piston stems. The piston stem must enter the go side of the ring gauge and must not enter the no-go side. Otherwise, the piston should be condemned.

Single-End Pin Gauge No. 42000—The measuring end of this gauge is used to gauge the bores. If any bore is worn enough to permit entry of its respective gauge, the bushing should be condemned.

Piston Bushing Gauges—

(1) Diameter of Emergency Piston Bush Cylindrical Gauge No. 49614, Pc. 524949 or N-5694.

(2) Diameter of Service Piston Bush Cylindrical Gauge No. 49616, Pc. 524950 or N-5695.

(3) Diameter of Vent Valve Piston Bush Cylindrical Gauge No. 49623, Pc. 524951 or N-5697.

(4) Diameter of Accelerated Release Piston Bush Cylindrical Gauge No. 49638, Pc. 524952 or N-5696.

Gauge No. 49614. The following directions describe the process of gauging the emergency piston bush to determine the correct piston ring size. The same procedure is applicable to all bushings, using the respective numbered gauges.

The outside diameter of the gauge is slightly smaller than a new cylinder, allowing application to any cylinder by holding the gauge at the ribs and inserting with a rotating motion; the square dial must be in proper position when applying the gauge to the cylinder. After the dial gauge is inserted the dial should be rotated clockwise with the finger until it comes in contact with the cylinder wall.

Do not use pressure.

If the bushing gauge does not enter the cylinder, the bush is condemned.

If Mark 2 does not clear the cylinder, No. 1 ring is required.

If Mark 2 clears and 3 does not clear the cylinder, No. 2 ring is required.

If Mark 3 clears and 4 does not clear the cylinder, No. 3 ring is required.

*If Mark 4 clears and Mark COND does not clear the cylinder, No. 3 ring is required.

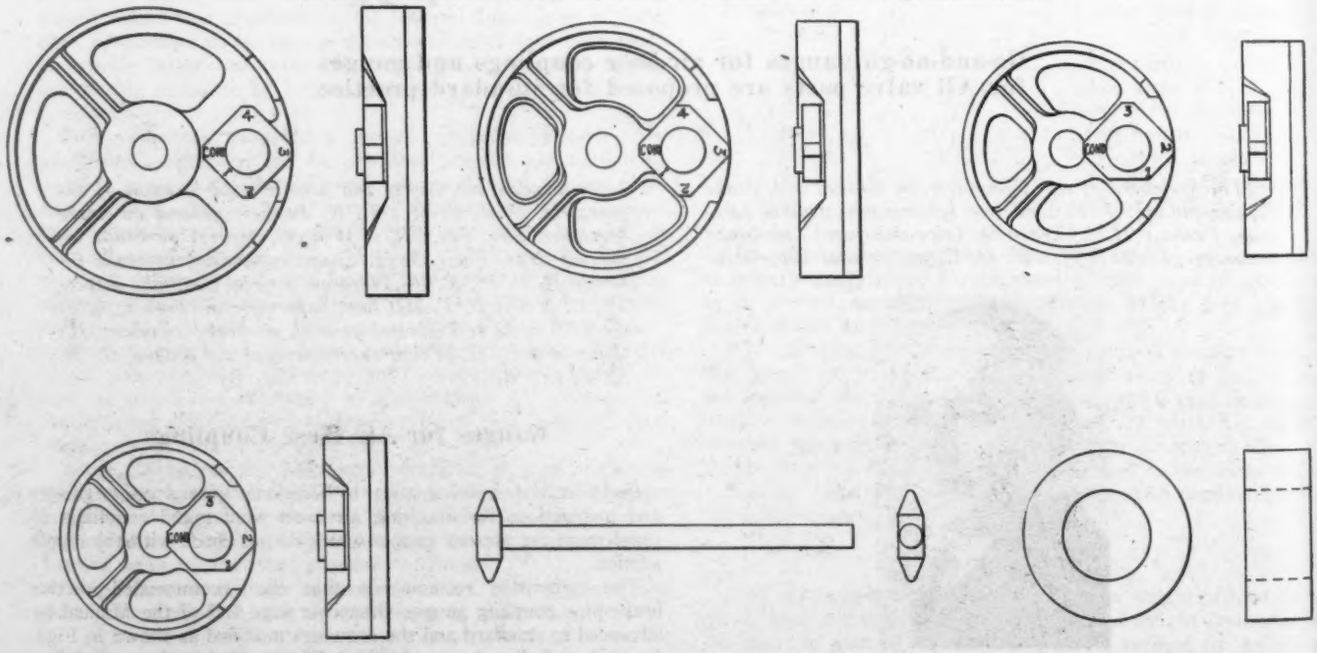
If Mark COND clears the cylinder, the bush must be condemned.

Rings of other than the size indicated by the gauge must not be used, because, if the ring is under size, insufficient wall pressure results in ring leakage; if over size, the operation of the valve will be interfered with because of butted ends and increased resistance to movement under many service conditions.

Cleaning Period for D-22 Control Valves

Progress was reported in tests to determine whether the cleaning period for D-22 control valves of improved HSC brake equipment can be advanced from 15 to 36 months.

* Mark 4 is used on gauges No. 49614 and No. 49616 only. No. 3 rings are the largest used in the other two bushings.



Left, above: 4-in. cylinder-ring selector and condemning gauge for service-piston bushing —Below: 2¾-in. cylinder-ring selector and condemning gauge for accelerated-release piston bushing

Middle, above: 3½-in. cylinder-ring selector and condemning gauge for emergency piston bushing—Below: Condemning gauge for checking service and emergency piston-guide bushing

Right, above: 3-in. cylinder-ring selector and condemning gauge for large vent-valve piston bushing—Below: Condemning gauge for checking outside diameter of the tail portion of service and emergency pistons

Fig. 1—Ring selector and condemning gauges for AB valve bushings and piston tails

FAILURES REPORTED TO MARCH 5, 1946

Total No. of cars on test	Relays			D-22 portions	
	"B-21"	"F"	"A"	Service	Emergency
104	16	12	7	15	7

Slack adjusters	Brake cylinders	Reservoirs	Seals broken
69	15	1	4

Premature failures were also reported on two speed governors, two release valves and one application valve.

To March 5, 1946, 31 cars have been reported for 18 months test, 6 cars for 30 months test, and 2 cars for 36 months test.

A complete report, with recommendations, will be prepared after the three-year period has elapsed.

No Spliced Air-Hose in Interchange after 1946

Recommendation was made to the Arbitration Committee that the application of spliced hose be abrogated, but the rules revised to permit the interchange of cars now equipped with spliced hose for at least one year, or until the spliced hose becomes defective. This was concurred in by the Arbitration Committee and included in the 1946 Code of Interchange Rules, with proviso that after December 31, 1946, the use of spliced air hose will not be permitted on cars in interchange.

AB Accelerated Release Caps Can Be Replaced

A. A. R. Leaflet No. 2391, dated June, 1945, published by the air brake manufacturers, prohibits the replacement of the accelerated release caps with plain caps on AB valves. The Brake and Brake Equipment Committee has now authorized the replacement of defective accelerated release caps with plain caps.

Passenger Brake-Cylinder Piston Lubricator

The manufacturers were requested to consider the designing of a brake cylinder piston sleeve lubricator similar to that developed for the AB brake cylinder. A design of non-pressure head for passenger-car brake equipment with a piston sleeve lubricator similar to that developed for the AB cylinder was submitted by the manufacturers and approved.

Code for Single-Car Test Device

A subcommittee has for some time been studying the necessity for amplifying the single-car test code for AB valves, as shown in the A. A. R. Instruction Pamphlet No. 5039-1, for the purpose of determining whether the present single-car test device and test code are entirely satisfactory for present day operating conditions. All committee members were requested to make tests on a number of cars for a three-month period, using an amplified test proposed by the subcommittee, after which further report will be submitted.

Freight Retainer Valves

The committee recommends, as a letter ballot item, that the Recommended Practice four-position slow-release retaining valve adopted in 1941 (Manual page E-33) be advanced to Standard, to replace the present Standard three-position 10-20-lb. duplex-spring type valve (page E-12 of the Manual); also, that the Interchange Rules be modified to require that cars built new on or after January 1, 1947, must be equipped with the new Standard four-position slow-release retaining valve.

Inspection of Armored Passenger-Car Hose

A number of cases of flat wheels and stuck brakes on passenger cars equipped with D-22 control valve and truck-mounted brake cylinders have been reported, some of which were caused by defective inner lining of the hose or damaged armor which restricted the flow of air. As many of these hoses have been in service for a long time without inspection, the following instructions should be followed for armored hose used with air brake equipment:

1—Any armored brake pipe, signal line, straight-air line or brake cylinder hose, regardless of whether the hose is constructed of synthetic or natural rubber, not receiving a sight inspection during the past 15 months should be removed at the first opportunity for sight inspection.

2—Remove hose, examine armor and fittings. If damaged, it should be replaced. If the hose is not damaged, sight through it into a frosted electric light bulb of not less than 150 watts. Turn the hose slowly to observe for outstanding shadows in the tube. Such shadows would indicate excessive trapped oil or loose lining. The hose should be replaced.

Note: Armored hoses that have a choke in the fitting, such as a straight-air line hose, should be sight inspected from both ends.

3—Hose passing sight inspection should then be subjected to the normal pressure tests set up by the individual railroad's rules.

4—After the above inspection and test, all armored hose should be inspected and tested as often as conditions require to maintain them in safe condition for service, but not less frequently than at air-brake periodic attention.

Substitute Materials in Brake Equipment

The committee reviewed a list of 45 items submitted by the manufacturers of AB equipment parts, in the manufacture of which the use of substitute material had been approved for the emergency period. It also showed what the manufacturers will use to reconvert as the material becomes available. In some cases it was found that it was desirable to continue the substitute material used during the emergency, due to its better performance than the original material.

On account of trouble being experienced with plastic material used in bushings, four of the items have been referred back to the manufacturers for further consideration with the subcommittee.

Allpax Non-Pressure-Head Ring Packing

For information and recommendation that member roads make trial installation to some of the old style "AB" brake-cylinder non-pressure heads on non-interchange cars when the non-pressure head is equipped with the three-metal-ring and lubricator-type of packing, your committee has conducted tests on six Pennsylvania cabin cars which were equipped July 10, 1944, some of which were examined after 20 months' service. The examination indicated that they should perform satisfactorily for the three-year air-brake cleaning of AB brakes.

No change is necessary in the construction of the non-pressure head when the Allpax ring packing is installed. All new AB brake-cylinder heads now manufactured have the new style of felt piston-sleeve packing as reported in 1944.

AB Brake-Cylinder Release Valves

For information, and with suggestion the attention of the operating officials of member railroads be directed to the fact that the use of this release valve will considerably reduce time required to release "AB" brakes on cars in yards to speed up movement of trains, with the thought they may wish to apply these valves to some of their cars in non-interchanging service for further tests.

A specially designed AB brake-cylinder release valve for the purpose of releasing AB brake-cylinder pressure only to release one brake, instead of draining both the auxiliary and emergency reservoirs on cars in yards, was installed on 22 Great Northern ore cars in August, 1945. The committee visited the repair tracks on April 24, at Allouez, Wis., where the Great Northern had assembled twenty-two of their 24-ft. ore cars equipped with these release valves. Twenty-one of these cars, which had been in operation since last Fall with a record of 30,000 miles, were coupled together on a repair track, and the following tests were made:

The train line was charged to 73 lb.; an emergency application was made, the brake-cylinder release valve was pulled on each 24 ft. car by one man in a total time for the 21 cars of 1 min. 32 sec.; after which the auxiliary reservoir was recharged to 70 lb. in 1 min. 34 sec., and the emergency reservoir to 70 lb. in 2 min. 12 sec., with 73 lb. brake pipe pressure.

The train line was charged to 73 lb.; an emergency application was made, the auxiliary and emergency reservoir on each 24 ft. car were drained in a total time for the 21 cars of 7 min. 41 sec.; the auxiliary reservoir was recharged to 70 lb. in 10 min. 57 sec., and the emergency reservoir to 70 lb. in 11 min. 27 sec.

It will be noted that considerable time can be saved by the use of these valves in getting AB brakes released.

The operation of this release valve is accomplished by giving a short time pull on a release rod from either side of the car, this rod being similar to the release rod used on the reservoir release valve. This operation automatically closes brake cylinder supply air and exhausts brake-cylinder pressure. The valve is automatically returned to its normal position when the brake-pipe pressure is increased.

(The report was accepted and referred to letter ballot.)

Report of the Arbitration Committee*

The elimination of spliced air hose and a method of handling badly damaged cars returned to the owner under all conditions are among the recommendations

[The members of the Arbitration Committee are: J. P. Morris (chairman), general mechanical assistant, A. T. & S. F.; J. A. Deppe (vice-chairman), superintendent car department, C. M. St. P. & P.; W. N. Messimer, assistant superintendent of equipment, N. Y. C. System; L. Richard-

J. P. Morris,
Chairman

son, mechanical assistant to vice-president and general manager, B. & M.; G. E. McCoy, assistant chief of car equipment, Can. Nat'l; M. R. Reed, assistant chief motive power (car), Penna. System; M. F. Covert, general superintendent equipment, General American Transportation Corporation, and J. J. Root, Jr., vice-president, Union Tank Car Company.]

During the year Cases 1812 to 1818, inclusive, have been decided and copies forwarded to the members.

With the approval of the General Committee, the effective dates of the requirements in Rule 3 with respect to metal badge plates and bottom-rod and brake-beam safety supports are extended to January 1, 1947.

With the concurrence of the Committee on Couplers and Draft Gears, it is recommended that the effective dates of Rule 3 requirements prohibiting acceptance from owners of cars equipped with couplers having 5-in. by 5-in. shanks and cars equipped with certain couplers having 5-in. by 7-in. shanks. be extended to January 1, 1948.

Upon the recommendation of the Committee on Brakes and Brake Equipment and in order to eliminate obsolete types of retaining valves, it is recommended that Paragraph (a-1-b) of Rule 3 be modified to require pressure-retaining valves of not less than the A.A.R. standard three-position double-spring type, including spring caps designed to prevent the distortion of springs, on all cars received from owners on and after January 1, 1949.

With the concurrence of the Committee on Brakes and Brake Equipment, Rule 57 is modified to prohibit the use of spliced air hose on cars in interchange service on and after January 1, 1947.

With the concurrence of the Committee on Wheels, it is recommended that paragraph (b) of Rule 82 be modified to provide additional conditions under which a mate wheel with brake-burn cracks or comby spots may be scrapped when removed from service in connection with a defective axle or the other mate wheel.

Modification of Sub-Section 1, Section A of Rule 112 is recommended, to provide a method of handling and a complete basis of settlement for badly damaged cars returned to owner under all conditions.

The Committee does not feel that any of the modifications included in its report necessitate submission to letter ballot.

* *Brackets indicate deletions from present rules. Italics indicate additions to present rules.*

Proposed revisions of Freight Car Rule 2 and Passenger Car Rule 2 covering the acceptance in interchange of cars using compressed or liquefied gas as fuel for heating, lighting, refrigeration or air conditioning, were submitted to letter ballot in Circular DV-1090 dated August 24, 1945, and approved. However, because of the substantial negative vote and the reasons therefor, modification of these rules was held in abeyance by the General Committee and the matter referred to the committee for study and recommendation. The report, as prepared and transmitted to the General Committee, is published as a part of that committee's report.

Attention is again directed to the fact that the Arbitration Committee will not consider questions under the Rules of Interchange unless submitted in the form of Arbitration Cases as per Rule 123.

Rule 3

The Committee recommends that effective dates for various requirements in the present rule, as listed below, now set at January 1, 1947, be extended to January 1, 1948:

Section (b), Paragraph (9)—Braking power: braking ratio.

Section (c), Paragraph (10)—Couplers having 5-in. by 5-in. shanks.

Section (c), Paragraph (11)—Couplers having 5-in. by 7-in. shanks.

Section (c), Paragraph (12)—Couplers, bottom rotary operated, not equipped with assembled riveted-type lock-lift lever and toggle.

Section (t), Paragraph (10)—Tank Cars: metal placard holders.

Section (u), Paragraph (4)—Class E-3 cars not to be accepted from owner.

Reason: The present situation justifies these extensions.

The Committee recommends that Paragraph (a-1-b) of this rule be modified as follows:

Proposed Form: (a) (1-b) Air brakes. Pressure-retaining valves of not less than the A.A.R. standard three-position double-spring type, including spring caps designed to prevent distortion of springs, required on all cars built new or rebuilt, and on all cars equipped with AB brakes in place of K brake equipment, on or after January 1, 1943. *Effective January 1, 1949, the foregoing requirement will apply to all cars.* From owners.

Reason: To eliminate obsolete types of retaining valves, as recommended by the Committee on Brakes and Brake Equipment.

Rule 4

The Committee recommends that the note following Paragraph (f-3) of this rule be modified effective August 1, 1946, as follows:

Proposed Form: Note.—Bent metal side and end sheets are cardable only when [bent] in connection with cardable bent posts, stakes, braces, metal top chord angles, *side and end sills,* or their substitutes.

Reason: To eliminate the apparent misunderstanding that sheets bent inwardly, when associated with cardable side and end sills, are not also cardable.

The Committee recommends that Paragraph (g-1) of this rule be modified in the next supplement as follows:

Proposed Form: (g) (1) All cars.—Metal end sill, damaged in unfair usage, when its removal from car is necessary for repairs [to end sill or to;] *or when necessary to repair on or off car in connection with* other associated unfair usage damage [on car.]

Reason: To clarify the intent.

The Committee recommends that Paragraph (g-2) of this rule be modified, effective August 1, 1946, as follows:

Proposed Form: (2) All cars.—Metal side sills, [extending from bolster to end sill only] if *both* flange *and* [or] web *are* [is] bent in excess of 2½ inches.

Reason: To provide specific limitation of responsibility for damage to full length side sills.

Rule 32

The Committee recommends that the note following Paragraph (10-k) of this rule be modified, as follows:

Proposed Form: Note.—The handling line is responsible and defect cards should be issued for damage to cars resulting from hot lading having been placed therein, or from open flames used to thaw out frozen lading to facilitate unloading, where parts of cars are damaged to the following extent by overheating:

Reason: To clarify the intent.

Rule 56

The Committee recommends that Items 6 and 7 of this rule be modified, as follows:

Proposed Form: 6. Loose or defective fittings, either or both ends of hose [, or at joiner on spliced hose.]

7. End of tube ⅜ in. or more from shoulder on either nipple or coupling, [or joiner on spliced hose.]

Reason: Account of change in Rule 57.

Rule 57

The Committee recommends that the first paragraph of this rule be modified, as follows:

Proposed Form: Rule 57. Cars not equipped with A.A.R. Standard 1¾-in. air brake hose, [or spliced hose per A.A.R. Specifications.] For label [for new hose,] see below.

Reason: To prohibit the use of spliced air hose on cars in interchange service after January 1, 1947. This recommendation has the concurrence of the Committee on Brakes and Brake Equipment.

Rule 69

The Committee recommends that a new Paragraph (g) be added to this rule, effective August 1, 1946, to read as follows:

"(g) It is permissible to mount second-hand experimental cast-iron wheels of 1942 design having changed flange and flange-supporting brackets, marked 'A.A.R.X.' and cast subsequent to 1941, with second-hand A.A.R. Recommended Practice single-plate bracketed cast-iron wheels."

Reason: The mating of such wheels has been approved by the Committee on Wheels.

Rule 70

The Committee recommends that Section (e) of this rule be modified, effective August 1, 1946, as follows:

Proposed Form: (e) The substitution of one-wear wrought-steel wheels for multiple-wear wrought-steel wheels, cast-steel wheels or steel-tired wheels does not constitute improper repairs, except on passenger equipment cars, freight cars equipped for passenger train service, or freight cars of over 70-ton capacity, *in which cases the principles of Interpretation No. 4 to Rule 98 apply as to charges and credits and issuance of defect card.*

Reason: To provide for charges and credits where improper wheel substitutions of this kind are made.

Rule 82

The Committee recommends that Paragraph (b) of this rule be modified, effective August 1, 1946, as follows:

Proposed Form: (b) Brake burn *and comby*: Cast-iron wheels removed from service account condition of axle or mate wheel shall be classed as scrap: (*1*) If brake burn crack is 2 in. or more in length across the tread; [Cast-iron wheels removed from service account condition of axle or mate wheel and found to be comby shall be classed as scrap if such] (*2*) *If more than three brake burn cracks are 1¾ in. or more in length across the tread;* (*3*) If comby spot is broken out so as to leave a continuous cavity one inch or more in length measured circumferentially on the tread; (*4*) *If more than three comby spots having continuous cavities one inch or more in length measured in any direction on the tread;* (*5*) *If any combination outlined in Items* (*2*) *and* (*4*) *totals four or more.*

Reason: Wheels having such defects are considered as unfit for reapplication and are being scrapped. The Committee on Wheels concurs in this modification.

Rule 98

The Committee recommends that a new Paragraph (6) be added to Section (c) of this rule, effective August 1, 1946, to read as follows:

"(6) Experimental cast-iron wheels of 1942 design having changed flange and flange-supporting brackets, marked 'A.A.R.X.' and cast subsequent to 1941, take the same status as the A.A.R. Recommended Practice cast-iron wheels. Such serviceable second-hand wheels may be mounted with second-hand single-plate bracketed wheels."

Reason: To provide for charges, credits, substitutions, etc., of 1942 design cast-iron wheels. as recommended by the Committee on Wheels.

Rule 101

The Committee recommends that Item 2 of this rule be modified as follows:

Proposed Form: 2. Air-brake hose, A.A.R. Standard [or spliced per A.A.R. Specifications], average credit for fittings for same.

Reason: The use of spliced air hose on cars in interchange service is prohibited on and after January 1, 1947.

Rule 107

The Committee recommends that the first note following Item 301 of this rule be modified in the next supplement, as follows:

Proposed Form: Note.—Metal weight involved is total weight of all metal parts in both body and trucks, including axles, wheels [, complete couplers] and journal bearings.

Reason: To harmonize with change in Section (g) of Rule 120.

Rule 112

The Committee recommends that Sub-Section 1 of Section A of this rule be modified, effective August 1, 1946, to read as follows:

Rule 112. Section A.—Rebuilt and Non-Rebuilt Cars:

1. (a) When a foreign freight-train car is destroyed or badly damaged under any condition for which the handling line is responsible, the owner upon request of the handling line, shall promptly furnish a statement showing its A.A.R. depreciated value.

1. (b) If it is estimated by the handling line that the car is not damaged to the extent of its A.A.R. depreciated value less salvage, it may—

(1) Make complete repairs at its own expense, or

(2) Make such repairs at its own expense as may be necessary to safely move the car home on its own wheels, in which event a defect card bearing notation "Home for Reapirs" shall be attached covering the unfair usage damage; or

(3) Send car home with defect cards attached, loaded on another car, and assume the cost of loading, $25.00 for unloading, and transportation to home line. Car owner must be consulted as to the shop to which he desires the car sent and will assume the cost of transportation on own line.

1. (c) If it is estimated by handling line that the cost of repairs will equal or exceed the A.A.R. depreciated value less salvage, and, therefore, it prefers to settle for the car at its depreciated value—

(1) It shall, within 15 days after receipt of depreciated value statement, so advise the owner and furnish a list of the major items of damage.

(2) Within 10 days after receipt of this information, the owner must notify handling line whether he desires to have the car repaired or to have the settlement made on depreciated value basis. In the latter event the owner will indicate the items of material, if any, to be recovered under provisions of Section J of this rule.

(3) If the owner requests that the car be sent home for repairs, such request shall constitute authority for handling line to make temporary or partial repairs as may be necessary at a cost not to exceed $50.00, chargeable to owner, for movement of the car home on own wheels. If the car cannot be so conditioned for this amount and owner does not desire to authorize a greater expenditure, the car shall be sent home loaded on another car or cars (preferably one car), in which event the handling line shall not charge the owner the cost of loading nor transportation over its own line. Car owner shall, however,

assume transportation costs on his line, or any intermediate line, and also cost of unloading.

(4) Upon arrival home, should the owner elect to retire instead of repair the car, he shall pay the handling line $50.00 for loading, plus cost of transportation over the handling line (or latter's proportion where a through rate is involved), and the owner may render a bill in accordance with Rule 94.

1. (d) (1) If the car is returned to the owner, either upon his authorization or at the option of handling line, with defect card attached covering damage, upon completion of repairs, a bill may be rendered against the handling line on the basis of the Interchange Rules; however, bill may not exceed the A.A.R. depreciated value less net salvage. The salvage value is the sum obtained by multiplying the light weight in pounds by one-half cent and then deducting an arbitrary dismantling cost of $30.00 Separate bills shall be rendered in such cases.

Note 1.—In cases where the handling line sends car home on the authority of the owner and is satisfied the cost of repairs to the damage exceeds the depreciated value less net salvage, it should, upon completion of repairs, authorize a bill without requiring submission of detailed repair cards.

Note 2.—A bill for repairs versus the handling line shall not exceed the depreciated value of car less salvage, but if the cost of repairs is less than the amount, the car owner may include in bill the expense incurred for temporary and partial repairs, or transportation charges, or proportion thereof which will bring the total bill up to the depreciated value less salvage.

Reason: To provide a method of handling and a basis of settlement for badly damaged cars returned to owner under all conditions.

Rule 120

The Committee recommends that first paragraph of Section (g) of this rule be modified in the next supplement, as follows:

Proposed Form: (g) If owner authorizes dismantling, handling line shall allow credit at A.A.R. second-hand value for wheels and axles in serviceable condition for reapplication under the rules. *Unserviceable wheels and axles and all journal bearings shall be credited at scrap prices shown in Rule 101. All other metal parts shall be credited at one-half cent per pound. From the total credit, deduct labor cost of dismantling, per Item 301 of Rule 107.* However, owner shall have the privilege of having returned serviceable cast-steel truck side frames, metal truck and metal body bolsters, metal draft arms, friction draft gears, cast-steel yokes, metal ends, AB brake equipment, auto loading devices, and refrigerator-car circulating fans; also tanks, special castings and valves of tank cars; by attaching to the statement of estimated weights a list of such parts with full shipping instructions; such parts to be billed at [A.A.R. scrap value] *one-half cent per pound* plus 7 per cent for handling f.o.b. point of shipment.

Reason: To clarify the intent.

Passenger Rule 2

The Committee recommends that the first paragraph of this rule be modified in the next supplement, as follows:

Proposed Form: Rule 2. Cars, loaded or empty, offered in interchange with defects for which owner is responsible, provided they are equipped with air brake, air signal and steam-heat train line having end steam valves and otherwise meet the requirements of receiving line as to *type of construction,* safety and clearances, must be accepted, with the following exceptions:

Reason: To clarify the intent with respect to cars of wooden superstructure or composite truck construction.

The Committee recommends that the effective date of Paragraph (e) of this rule, with respect to equipping all-steel underframe cars with cardboards of suitable receptacles for accommodation of defect and joint evidence cards, and effective date of Paragraph (f) covering the application of brake-shoe spark shields to passenger train cars having underneath exposed wood parts over the wheels, both requirements now being set at January 1, 1947, be extended to January 1, 1948.

Reason: The present situation justifies these extensions.

(The report was accepted.)

Report of Committee on Journal-Bearing Development

Emergency designs tested and found satisfactory—Survey made to determine causes for scrapping of bearings—Future development possibilities listed

[The members of the Committee on Journal Bearing Development are: J. R. Jackson (acting chairman), engineer of tests, Mo. Pac.; J. W. Hergenhan, assistant engineer test department, N. Y. C. System; V. C. Barth, chief chemist, C. & N. W.; L. B. Jones, engineer of tests, Penna., and C. B. Bryant, chief engineer, Technical Board, Wrought Steel Wheel Industry.]

J. R. Jackson
Chairman

The Committee on Journal Bearing Development was set up late in 1941 as an emergency war activity under the national program for the curtailment of critical and scarce materials. At that time, the nation was faced with future shortages in copper, tin and other non-ferrous metals and, in the interest of the national defense, the railroads were requested to curtail the use of these metals through reduction in weight, changes in composition and substitution of less critical materials in railway equipment wherever possible. The non-ferrous metal in the railway car journal bearing pool represented a considerable tonnage which was considered as a possible source of critical materials for war use and the railways, through the A.A.R., were requested to carry out:

(1) Immediate curtailment of critical materials to the extent possible through weight reduction and change in composition and (2) undertake a program of research to develop substitute designs and materials to make the major part of the metal in the journal bearing pool available for war use if and when required. This committee was set up to carry out this assignment.

To enable the committee to proceed on a factual basis insofar as possible under the war emergency conditions, arrangements were made to utilize the existing laboratory facilities of the Railway Service and Supply Corp., Indianapolis, Ind. This organization had designed and installed a railway car journal bearing testing machine where full-sized 5½ in. by 10 in. bearings could be subjected to a range of load and speed conditions simulating service, and performance observed and recorded by appropriate instruments.

The work at Indianapolis carried on under the direction of the Committee has been progressively reported in a series of bulletins distributed to the members through the Office of the Executive Vice-Chairman, Mechanical Division.

Survey of Bearings-in-Scrap

As the result of the war emergency, valuable information relative to car journal bearing design has evolved through what is to be considered as a service test on an unprecedented scale. To evaluate the effect of the plan-view dimensional changes made in the so-called "emergency" design in comparison with those of the pre-war design, Committee members made an individual check of bearings-in-scrap during 1942-43, which indicated that end wear and spread linings had been materially reduced through the dimensional changes made in the modified and emergency design. In order to develop a factual basis for comparison on a more comprehensive scale, a group of 25-member roads in the United States and Canada were requested to make a check of bearings-in-scrap for a 12-month period ending with November 1945. Tabulation of the results of this member road cross-sectional survey is presented in Exhibit "A". The total of 1,274,328 bearings checked in 5 in. by 9 in., 5½ in. x 10 in. and 6 in. by 11 in. sizes consists of 717,182 pre-war and 557,146 "emergency" design. No differentiation of the crown thickness changes made in the "emergency" design bearings during 1943-44 was attempted in this survey. The significant facts made available through this survey, as covering controversial points surrounding the "emergency" design, are shown in Table I.

Table I—Comparison of reasons for failure of pre-war and emergency bearings

Bearings Removed Account	Bearings-in-Scrap Pre-war	Per Cent of Group Totals "Emergency"
Item 2—End Wear—Lug End	5.57	4.18
Item 2—End Wear—Fillet End	10.20	8.96
Item 2—End Wear—Both Ends	18.17	8.74
Item 2—End Wear—Totals	33.94	21.88
Item 5—"Spread Lining"	24.70	16.24
Item 6—Not Condemnable	13.00	25.08
Item 7—Ran Hot in Service	6.47	12.95

The statistics for end wear reflect the influence of the shortening of the bearing at the lug end and changes in lug location and collar thickness to reduce the contact of the lug end of the bearing with the axle end collar. The effect of the reduction of the width is reflected by the decreased percentage of "spread linings." These two items taken together reflect the influence of the plan view dimensional changes made in the "emergency" design and indicate that the changes made were effective and not excessive.

The relatively high percentage of "emergency" bearings scrapped when not condemnable under Rule 66 (Item 6) and ran hot in service (Item 7) appears to have been due to something other than bearing design. Apparently, poor judgment or misunderstanding of the conditions attending the change in bearing design resulted in large numbers of serviceable emergency design bearings being scrapped on periodic repacking inspections at many points throughout the country. The higher percentage of "emergency" design bearings involved in overheatings may be explained as due largely to the fact that during the period of the survey only "emergency" design bearings and relined bearings were available, hence these bearings had to take the brunt of the break-in period, as well as rebrassing on damaged journals to get cars into repair points after developing hot boxes on line.

Post-war A. A. R. Standard

At a meeting held in Chicago on May 1, 1946 the committee again reviewed the question of journal bearing dimensions, and after careful consideration of the several suggestions covering a post-war A. A. R. standard design, made a report to the General Committee recommending:

(1) Design shown on Page E-D-24-1945 be advanced to standard replacing the present standard design shown on Page D-24-42 of the Manual.

(2) Procedure indicated in (1) be submitted to the Association as a letter ballot item.

Service Tests

As a part of the research program involving investigation of bearing design modifications with an object of further reduction in weight of critical and scarce non-ferrous metals over that realized in the "emergency" design modifications, the committee members made service tests of the designs indicated as most promising through the laboratory tests on the machine at Indianapolis. These service tests, all of 5½-in. by 10-in. journal size were started in 1942 and concluded during 1945. Compilation of the results of these road tests are given in Exhibit "B," Sheets 1 and 2. Photographs, dimensions and weights, in detail, of the several bearing design modifications included in these road service tests are given in Bulletins No. 4 and No. 5.

These road tests are of general interest as indicating the further possibilities in conservation of non-ferrous metals in railway car journal bearings which could have been put into effect had the available supply of non-ferrous metals become more critical.

V-Bearing Assemblies

In compliance with a request by the Association extended to bearing manufacturers, railway supply companies and individuals to submit ideas for bearing design modifications in the interest of the national conservation program, the Railway Service and Supply Corp., Indianapolis, Ind., submitted a design of a two-piece bearing. This design, which became known as the "V-Bearing," consisted of a malleable-iron adapter and a light weight lined bronze back bearing insert. Laboratory tests of this design were made during June 1942 and road tests conducted during that summer indicated that bearings of this design would give satisfactory service.

As a part of their development work, the R. S. & S. C. constructed a pilot plant at Indianapolis for manufacturing and assembling the V-Bearing parts from die-formed castings and centrifugally lined bearing inserts. During October 1942 the committee recommended the approval of a service test of a total of 20,000 assemblies of this design in interchange service. On Feb. 10, 1943, the General Committee approved test of a minimum of 8,000 V-Bearing assemblies in 5 in. by 9 in., 5½ in. by 10 in., and 6 in. by 11 in. sizes as divided between twenty roads, which were to keep a record and advise the Committee of the service obtained.

Owing to manufacturing delays, a total of only 2,336 of the V-Bearing assemblies, all 6 in. by 11 in. size, were shipped by the R. S. & S. C. during 1944-45.

Returns from the seven roads who have applied these bearings for service test are not sufficiently complete for the committee to make a report at this time but from available information, the limited number of V-Bearings under test appears to be giving satisfactory service.

Future Possibilities

The research program and supplementary studies carried out by the Committee on Journal Bearing Development during 1942-45, as a war activity within the national program for the curtailment of critical and scarce materials, was sufficiently comprehensive to indicate the direction along which further improvement of the solid type of car journal bearing for railway equipment should be directed. Two lines of future development appear to be open:

(1) Further improvement of bearing and associated parts in the present journal box assembly insofar as modifications and refinements can be carried out to interchange with present parts during the necessary transition period. As applying to the bearing, the following possibilities for further improvement are open:

(a) Tightening up of manufacturing tolerances and improvement in production procedure and finish of essential contact surfaces to correct the irregularities in the pre-war foundry product.

(b) Improved manufacturing practice and control to insure a more uniform bonding of linings to backs.

(c) Changes in finishing and gaging procedure at bearing manufacturing plants to establish closer alignment of wedge contact surfaces with journal bearing surface.

It is to be noted here that the above refinements will classify the car journal bearing as a finished part and that this step will not be economically justified without corresponding refinements in the wedge and in the registering and contact surfaces in the journal box.

(2) Redesign of the entire journal box assembly with the object of realizing the full possibilities of the solid type bearing to improve road performance over that obtainable with the

present conventional set-up. This is a full time research project which could well be undertaken by the Mechanical Division but which involves such design study and follow up procedure as to be outside the scope of the Committee's assignment.

Any post-war research program undertaken by the Mechanical Division to continue the study of journal bearing development, should be broadened to include roller bearings and to establish the engineering and economic facts pertaining to "anti-friction" vs "solid" bearings for railway equipment cars in interchange service.

(The report was accepted and its recommendations ordered submitted to letter ballot.)

Report of the Committee on Lubrication

Report on a study of roller-bearing lubricants proposes extensive program of further study—Need of Magnafluxing after overheating of journals emphasized

[The members of the Committee on Lubrication of Cars and Locomotives are: J. R. Jackson (chairman), engineer of tests, Mo. Pac.; L. B. Jones (vice-chairman), engineer of tests, Penna.; E. C. Ellis, superintendent car department,

J. R. Jackson, Chairman

C. & O.; A. J. Pichetto, general air brake engineer, Ill. Cen.; W. G. Aten, mechanical inspector in charge of lubricating matters, C. B. & Q.; J. Mattise, general road foreman engines, C. & N. W.; J. W. Hergenhan, assistant engineer, test department, N. Y. C. System, and D. C. Davis, lubrication supervisor, A. T. & S. F.]

Roller-Bearing Lubricants

A first progress report, approved by the committee at the meeting on April 30, 1946, relates to the tests carried out on the journal bearing testing machine in the laboratory of the Railway Service & Supply Corporation, Indianapolis, Ind., and to supplementary studies of the lubricants in the laboratories of the Pennsylvania and the Southern. All running tests reported were made during the year 1945 with an S. K. F. roller-bearing assembly mounted on the testing machine.

The object of the investigation was to study the behavior of the lubricants currently used by railroads for the lubrication of roller bearings on railway equipment cars, with a view of developing information leading to a better understanding of the basic factors involved and a more uniform practice by the railroads of the country as to the characteristics of the most desirable roller-bearing lubricants to be used in this class of service. The program did not contemplate studies of lubricants for steam-locomotive roller-bearing axles.

The following general conclusions were drawn from the data presented in the first progress report:

1—The railway type car journal roller bearing, carrying full load and at speeds up to 120 m. p. h., may be successfully operated with a rather wide range of lubricants.

2—The operating temperature of the journal and bearing is largely a function of the viscosity of the lubricant; the higher the viscosity the higher the operating temperature. All lubricants tested showed the tendency to increase in viscosity as a result of operating temperature and time in service.

3—The power requirements to operate the journal and bearing increases as the viscosity of the oil increases.

4—The indications are that the general type of lubricant now used on the railroads for lubrication of the conventional waste-packed solid car journal bearings is also a satisfactory and an economical lubricant for roller bearings under railway cars.

5—The work completed to date is not sufficiently comprehensive to permit formulating a detail specification for a lubricant for all types of roller bearing equipment on cars in interchange service on the railroads.

Based on the work completed to date it was recommended:

1—That the research program be continued and extenedd under A.A.R. direction to include:

(a) Measurement of the friction of the railway roller bearing versus the solid bearing, starting and running, normal and sub-zero outside temperatures.

(b) Extension of program to include other designs of roller-bearing equipment now in service on the railroads.

(c) Broadening of program to include an investigation of the special roller-bearing lubricants recommended by the petroleum industry for railway service.

(d) Further study of the corrosive influence of lubricants on roller-bearing parts.

2—That this program is of sufficient importance to the railroads to warrant setting up a full-time organization under the A.A.R. Mechanical Division to carry out these recommendations.

Journal-Box Lids

The Lubrication Committee's interest in this item lies in improving the present designs of lids and in setting up maintenance requirements to provide an adequate closure at the front of the journal box to insure retention of the oil and exclusion of the dirt and water under service conditions.

Working with the manufacturers, the joint subcommittee assembled samples of modified box lids at Altoona, Pa., for check and evaluation of construction details. From the information thus made available, revision of Specifications M-120 was prepared, submitted to the General Committee for approval, and by their action submitted to the Member Roads as a letter ballot item as Specifications M-120-46 in Circular No. D. V.—1096, dated April 20, 1946.

A summary of the field observations made by the subcommittee showing the conditions of journal boxes and lids in service on owned and foreign freight cars in interchange was circularized to the member roads with the secretary's letter of April 20, 1946.

Recommendations were made to the Committee on Car Construction concerning the application of bushings in hinge-lug pin holes and wear liners on hinge lugs of journal boxes and to set up definite standards for journal-box lids and box hinge lugs and lid registering faces, also repair standards, including gauging and methods of gauging, with the object of improving present conditions. It is felt that the hinge and face of the box should be held to closer mechanical standards to derive the full benefit of the improved box lid provided for in Specification M-120-46.

Packing Retaining Devices

In the 1945 annual report reference was made to the device known as the Hold-Rite packing retainer. Upon recommendation

of this committee at that time, an interpretation has been included under Rule 66 in the Interchange Code to provide that this device when removed at the time of wheel changes and periodic repacking inspections should be replaced if in serviceable condition and standard to car.

"To clarify any possible misunderstanding, your committee wishes to advise that the approval of the use of this device has reference only to the latest design, in which the longitudinal wires extending along the sides of the journal box are joined together by a metal band for the purpose of preventing contact with the journal.

"Your committee also desires to advise that their approval is predicated on the use of this device only in journal boxes in which it is properly applicable. The device is not approved for use in journal boxes having integrally cast waste retainer ribs, or in boxes of such other construction as to offer interference in application or removal of the device or to cause contact with the axle journal."

Hot-Box Statistics

The 1944 and 1945 reports included tabulations compiled from monthly statements of freight-car hot-box records on all A. A. R. member roads from date this record was started (September, 1942). This tabulation was brought up-to-date in this year's report. The monthly statements have been discontinued, as of February, 1946.

Hot-Box Alarm Devices

During the past year this program has been progressed and 29 hot-box alarm devices submitted have been subjected to laboratory tests. Some devices which proved deficient are being further improved by the manufacturer. Other manufacturers have indicated their intention to submit devices, which have not yet been received. Three devices have shown sufficient promise to warrant road tests, and are now in regular road service on Pennsylvania passenger coaches undergoing observation and development by representatives of this committee and the manufacturer.

The work to date has been confined to alarm devices applicable to the conventional design of journal box having the solid type of bearing and a tentative specification covering the requirements of an alarm device for this design of journal box has been formulated. The work of this special committee is being continued and will be extended to cover applications of alarm devices to roller-bearing journal boxes.

Broken Journals

During the year there have been several cases of costly derailments attributed to broken journals, where investigation developed that the journal failures originated from heat cracks resulting from previous overheatings and which were not properly removed at the time of checking and refinishing the damaged journals. The Lubrication Committee again emphasizes the importance of providing all wheel shops where overheated journals are reconditioned with facilities for making Magnaflux inspections as required in the Wheel and Axle Manual and by Interchange Rule 69.

Discussion

It was suggested that the committee, in continuing its research on lubricants for roller bearings, give that major consideration to the problem of corrosion results commonly known as "water etch". This, according to the committee chairman, is on the program for further study.

Another member raised a question as to the value of a study of friction of roller versus plain bearings on the ground that after a journal is in motion the journal friction is such an insignificant part of train resistance that it is of relatively little importance.

The question was asked from the floor as to whether a journal that had run hot enough to "pick up brass" should be Magnafluxed. To an affirmative answer by the committee chairman the comment was added that in any event such a journal should come out of service and be inspected carefully.

Another member suggested that the ruling recommended by the Wheel Committee as to Magnaflux inspection should have "teeth" in it and that his road had installed 19 testing machines for the inspection of axles.

(*The report was accepted.*)

Report of the Committee on Wheels

Modification in design of two chilled wheels to eliminate retarder interference; study of impact effect of flat spots on wheels and revisions in wheel practice

[*The members of the Committee on Wheels are: C. B. Bryant (chairman), chief engineer, Technical Board, Wrought Steel Wheel Industry; E. E. Chapman (vice-chairman), mechanical assistant, A. T. & S. F.; H. W. Coddington, research and test engineer, N. & W.; H. H. Haupt, general superintendent motive power, Penna.; A. G. Hoppe, general superintendent locomotive and car departments, C. M. St. P. & P.; A. M. Johnsen, engineer of tests, Pullman Company; E. C. Hardy, assistant engineer, N. Y. C. System; F. Holsinger, wheel shop foreman, Markham shop, Ill. Cen.; W. R. Hedeman, engineer of tests, B. & O., and P. V. Garin, engineer of tests, Sou. Pac.*]

C. B. Bryant,
Chairman

Preliminary experience with the experimental design of chilled-iron wheels that were authorized during August, 1944, disclosed that there was interference between the reinforced flanges of the experimental design and certain unusual types of car retarders and guard rails. Further investigation has resulted in the development of a modification of the experimental design. The modified designs as covered by drawings Nos. 1446 and 1447 of the Association of Manufacturers of Chilled Car Wheels have been approved by the Wheel Committee and submitted to the A.A.R. Engineering Division for approval as to track relationships. Assuming that Division's concurrence, authority for the resumption of manufacture for 150,000 750-lb. wheels and 50,000 850-lb. wheels of the revised design will be requested. These wheels will be known as the 1946 design, experimental designation being "AAR XI."

Instrumental Determination of Chill Limits

Since the 1945 report covering determination of chill limits by means of hardness determinations the Association of Manufacturers of Chilled Car Wheels has been able to place further restrictions on the maximum permissible hardness of wheels manufactured to their specifications.

The major changes include the addition of a maximum permissible hardness in the outer portion of the rim; a reduction to 200 Brinell in the permissible hardness in the throat of flange section of the 750-lb. and 850-lb. wheels and a reduction to 225 Brinell in the case of 650- to 700-lb. wheels. The new hardness test in the rim does not apply to the 650-lb. wheels but does apply to all of the other standard weights. On the wheels which are subject to rim hardness tests, the test at the center of the tread has been eliminated. The maximum chill is controlled by hardness readings in the throat of hardness section and the outer rim section of these wheels.

In the case of the 650-lb. wheels hardness readings are still taken at the center of the tread. Numerous tests have shown that the average distribution of chill and mottle in the tread of this wheel results in a Brinell hardness of 215 at the point 1¾ in. below the center of the tread when the hardness 1½ in. below the throat of flange is at the new maximum of 225. The new maximum is therefore actually more restrictive due to the reduction in the distance from the tread surface.

These changes result in an appreciable reduction in the permissible depth of chill through the throat of flange section and a much more definite control of chill in the outer portion of the rim.

Wrought-Steel Wheels

The Joint Sub-Committee's report on standardization of wrought-steel wheels has been reviewed and submitted to letter ballot through Circular DV-1906. This circular also includes revisions in specifications for wrought-steel wheels.

Service Behavior of Chilled-Iron Wheels

As a consequence of the study of the service behavior of chilled-iron wheels a recommendation has been offered that a rule be established in the Interchange Code to prohibit the remounting of any double-plate cast-iron wheels and any single-plate non-bracketed (excluding the 650-lb. size) cast-iron wheels. In order to clarify Interchange Rule 82(b) covering the removal of chilled-iron wheels because of brake burn, a revision of that rule has been prepared and submitted to the Arbitration Committee.

Cylindrical Treads

The subject of standardizing the contour of cylindrical treads on new wrought-steel wheels is to be covered by a questionnaire to member roads, authorization for which has been obtained.

The Impact Effect of Flat Wheels

A sub-committee met on April 11 to consider a report issued by the Joint Committee on Relation Between Track and Equipment on an Investigation of the Impact Effect of Flat Wheels. The following information was developed as a result of this meeting:

(1) There was nothing in the report which would indicate that the present A.A.R. Interchange Rules covering slid-flat spots are unduly lenient insofar as damaging effect on track is concerned. The information contained in the report would appear to permit an increase in the permissible length of flat spots on passenger-car wheels insofar as damage effect on track is concerned.

(2) The report indicates that, insofar as the effect on the rail is concerned, while the stresses produced in the track by a 2½-in. flat spot increases with speed to approximately 10 m.p.h., there is no apparent increase in stresses for speeds above this to approximately 60 m.p.h. This appears to clear the way to run passenger trains having flat spots up to 2½ in. to their final terminal without rail damage provided passengers are not unduly inconvenienced by riding qualities or noise.

Manufacturers' representatives present indicated no concern as to the effect of the 2½-in. flat spot on the wheels themselves.

In considering future work, the sub-committee recommended that in addition to the effect on the rails consideration should be given to determining the effect on equipment. The report indicated suggestions as to the manner of making these studies and indicated that such a study might well include provision for determining rail stresses at speeds up to 100 m.p.h. The sub-committee's report also suggested the desirability of making observations on the effect of out-of-round wheels on both track and equipment.

Revision of Wheel and Axle Manual

Proposed revisions to Fig. 132-A and Paragraph 332 of the A.A.R. Wheel and Axle Manual have been offered to provide for a new wheel circumference measuring tape and the methods of its use for 35- to 52-in. wheels. The revised Fig. 132-A is a new drawing of tape showing tape sizes up to that required for a 52-in. diameter wheel. The additions to the drawing include the relative locations of tape sizes and wheel diameter between the limits of 35 in. and 52 in.

Paragraph 332 of the Wheel and Axle Manual has been revised as follows:

In the third sentence now reading, "For new cast-iron wheels, tape 3.5 (Fig. 132) represents a wheel of exact nominal diameter," the word *nominal* has been deleted and the dimension of *33* in. substituted. There has been included just before the last sentence in the existing Wheel and Axle Manual reading "All wheel tapes should be checked . . . etc." the following new sentence:

"The wheel circumference gage Fig. 132-A may be used not only for taping new wheels but for taping worn wheels of large diameter, inasmuch as this tape is calibrated in increments of 1 in. from a 35-in. diameter wheel to a 52-in. diameter wheel and may, therefore, be used for checking the worn diameter of any of the intermediate size wheels."

The Subcommittee recommends, as a letter ballot item, that the first sentence of Paragraph 355(b) of the Wheel and Axle Manual be modified to provide for the use of new type high-speed axle lathes using modified design tool arrangement, as follows:

Proposed Form—(b) Lathe tools used for finishing cuts on collars, journals, and wheel seats should have an edge approximately 1¼ in. wide and absolutely straight except for a ⅛ in. radius on one side for cutting the end collar fillet and suitable radius at the other side for cutting the back or dust-guard fillet, *or other tool arrangement that will give equivalent results.*

It is understood that, if this modification is approved, similar change will be made in first sentence of Paragraph 189 of the Wheel and Axle Manual.

It is recommended, as a letter ballot item, that Paragraph 355(o) of the Wheel and Axle Manual be modified as follows:

Proposed Form—(o) If journal surface or end of axle has pronounced coloring due to overheating, or if circumferential checks are found in wheel seats or body of axle, axle must be scrapped, unless such discoloration, checks or cracks can be turned out without going below the condemning limits, and the axle magnetic-particle tested before reapplication. (Also see paragraph 221-A for axle defects and Interchange Rules 84, 85 and 86.)

In this connection, it is also recommended that the last sentence of Paragraph 221 which reads "Where Magnaflux machines are available all dismounted axles must be Magnaflux inspected before reapplication," and the last sentence of Paragraph 209 which reads "Where Magnaflux machines are available, all axles, including those which have run hot in service, must be Magnafluxed after axles are reconditions, before they are returned to service," be eliminated, account revised Paragraph 355(o) covers.

Revision of Standard Practice Manual

The following modifications of the A.A.R. Manual of Standard and Recommended Practice were recommended:

(1) That the gauge for centering wheels on axles and the gauge for centrally locating the first wheel on the axle shown in Wheel and Axle Manual Figs. No. 117 and 117-A be adopted and included in Section B.

(2) That the alternate mounting gauges (Wheel and Axle Manual Figs. No. 118-A and 119-B) be adopted and included in Section B.

(3) That the instructions for using steel wheel contour gauge shown on pages B-44 to B-44D, inclusive, be eliminated.

(4) That the gauge designs shown on Manual pages E-B-45,

E-B-46A, E-B-49, E-B-50, E-B-108 and E-B-111 be adopted as standard to replace gauges shown on Manual pages E-B-45, B-46A, B-49, B-50, B-108 and B-111, respectively.

(5) That the wrought-steel wheel hub depression gauge shown on page B-69 be eliminated from the Manual.

(6) That the "Rules Governing Wheel Shop Practice" on pages D-41 to D-46, inclusive, be eliminated from the Manual. These are now covered by Section XX of the Wheel and Axles Manual.

(7) That the recommended practice covering the mounting of wheels shown on page D-55 of the Manual be eliminated. This is now covered in the Wheel and Axle Manual.

(The report was accepted and its recommendations submitted to letter ballot.)

Report on Locomotive Construction

Increased attention given to Diesel locomotives as the committee reports on the standardization, repair, fire-protection and a survey of that type of power

[The members of the Committee on Locomotive Construction are: H. H. Lanning (chairman), mechanical engineer, A. T. & S. F.; E. L. Bachman (vice-chairman), general superintendent motive power, Penna.; D. R. Calleri, mechanical engineer, Sou. Pac.; Frank Williams, chief mechanical engineer, Can. Nat'l; J. E. Ennis, engineering assistant, N. Y. C.; J. B. Blackburn, mechanical engineer, C. & O.; K. Cartwright, chief mechanical engineer, N. Y. N. H. & H.; L. H. Kueck, assistant chief mechanical officer, Mo. Pac.; G. W. Bohannon, assistant chief mechanical officer, C. & N. W.; A. G. Hoppe, general superintendent locomotive and car departments, C. M. St. P. & P., and C. M. House, superintendent motive power and equipment, Alton.]

H. H. Lanning, Chairman

The committee is reporting upon the following subjects which have been considered during the past year:

A. Development and use of oil-electric locomotives:
- 1—Survey of Diesels and performance statistics.
- 2—Standardization of Diesel locomotives and parts.
- 3—Classified repairs for Diesel locomotives.
- 4—Fire-protection equipment for Diesel locomotives.

B. Fundamental parts of locomotives:
- 1—Standardization of grooves and rings for piston valves.
- 2—Axle centering.
- 3—Method of determining locomotive Weight distribution.
- 4—Wheel slide control device.

C. Designs of handwheels for A. A. R. standard valves.

D. Driver and trailer tires.

E. Construction of fusion-welded boilers.

F. Boiler and firebox materials and construction.

It is recommended that axle centering and the method of determining locomotive weight distribution be submitted to ballot.

Oil-Electric Locomotives

Diesel Statistics

In the 1941 report the committee gave statistics on the number of Diesel locomotives in service by years from 1925 on. It was

Summary of Roller Bearings Applied to Diesel Locomotives as of December 31, 1945

Type	Service	Number in Class	Number of Locomotives Equipped with Roller Bearings on Drive Axles	Number of Locomotives Equipped with Roller Bearings on Idler Axles
A1—2	Passenger	1	1	0
A1A—A1A	Passenger	71	71	71
2—(A1A—A1A)	Passenger	23	23	23
3—(A1A—A1A)	Passenger	8	8	8
B—B	Pass., Frt. & Switch.	214	206	0
2—(B—B)	Frt. & Pass.	52	52	0
3—(B—B)	Frt. & Pass.	19	19	0
4—(B—B)	Frt. & Pass.	154	154	0
1B—B	Passenger	3	3	3
1B—1B	Frt. & Pass.	116	116	116
2—(1B—1B)	Frt. & Pass.	30	30	30
3—(1B—1B)	Frt. & Pass.	4	4	4
Totals		695	687	255
Miles—1945			138,498,960	58,701,570
Loco. Failures			9	5
Miles Per Loco. Failure			15,388,773	11,740,314

Note: Of 107 railroads reporting, 36 reported Diesel locomotives equipped and 71 railroads reported Diesel locomotives not equipped with roller bearings.

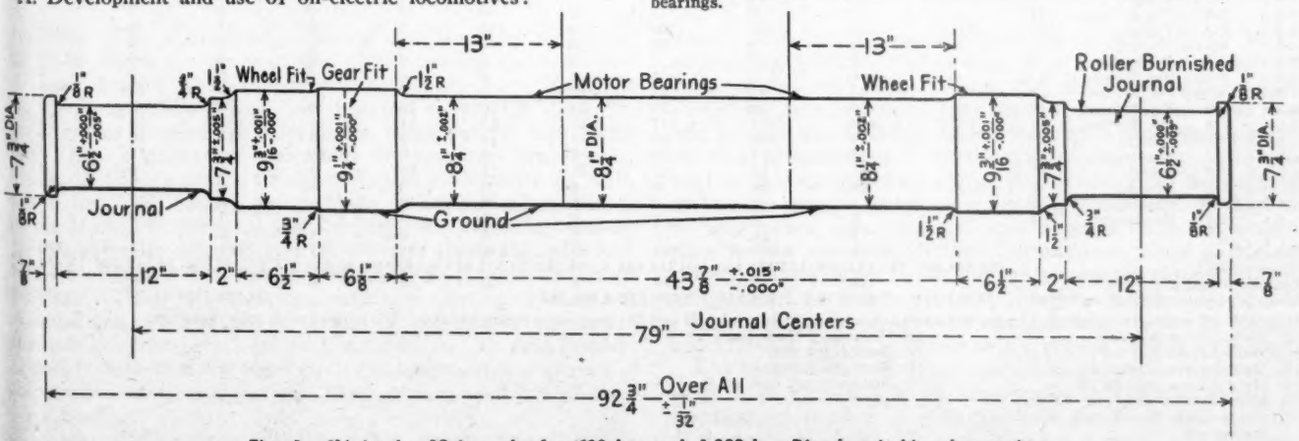
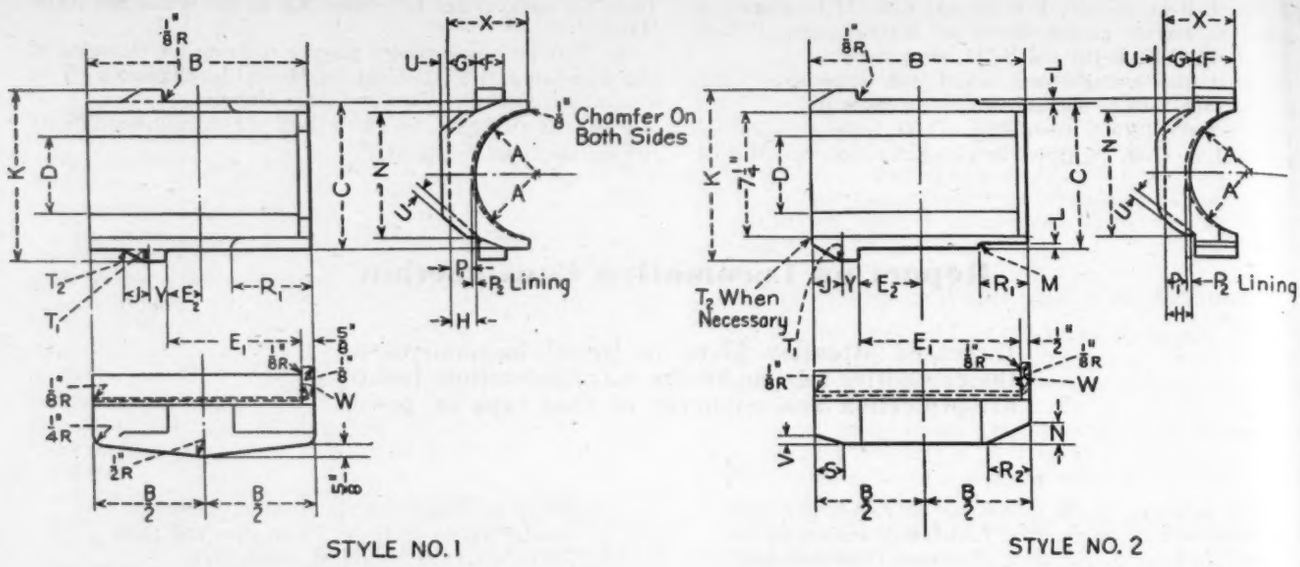


Fig. 1—6½-in. by 12-in. axle for 600-hp. and 1,000-hp. Diesel switching locomotives



STYLE NO.	A	B	C	D	E_1	E_2	F	G	H	J	K	L	M	N	P_1	P_2	R_1	R_2	S	T_1	T_2	U	V	W	X	Y	Z
1	$3\frac{9}{32}$"	$11\frac{3}{4}$"	$7\frac{5}{8}$"	4"	$7\frac{1}{8}$"	$1\frac{7}{8}$"	$1\frac{7}{16}$"	$1\frac{9}{16}$"	$1\frac{3}{8}$"	$1\frac{3}{8}$"	$8\frac{7}{8}$"	—	—	$6\frac{1}{2}$"	$1\frac{1}{4}$"	$\frac{1}{8}$"	—	—	—	$\frac{1}{2}$"	$\frac{1}{2}$"	$\frac{3}{8}$"	—	$\frac{3}{4}$"	$3\frac{13}{16}$"	$\frac{7}{8}$"	1"
2	$3\frac{9}{32}$"	$11\frac{1}{2}$"	$7\frac{47}{64}$"	4"	$8\frac{7}{16}$"	$3\frac{3}{16}$"	$2\frac{1}{4}$"	$1\frac{9}{16}$"	$1\frac{3}{8}$"	$1\frac{11}{16}$"	$8\frac{7}{8}$"	.242"	$\frac{3}{8}$"	$6\frac{1}{2}$"	$1\frac{1}{8}$"	$1\frac{1}{4}$"	$2\frac{3}{4}$"	$2\frac{3}{4}$"	$1\frac{5}{8}$"	$\frac{5}{8}$"	—	$\frac{3}{8}$"	$\frac{15}{32}$"	$\frac{3}{4}$"	$3\frac{13}{16}$"	$\frac{7}{8}$"	1"

Fig. 2—6½-in. by 12-in. journal bearings for 600-hp. and 1,000-hp. Diesel switching locomotives

thought desirable to bring these statistics up to date and in addition, it was thought desirable to make a new check of the cost of operation and maintenance of Diesel locomotives in the light of the greater experience obtained since the 1941 survey.

[A table showing the number of Diesel locomotives in service as of December 31, 1945, and another showing the assignment

Summary of Roller Bearings Applied to Steam Locomotives—As of December 31, 1945

Type			Number	Number of locomotives equipped with roller bearings on									
Engine	Tender	Service	in class	Engine truck axles	Driver axles	Trailer truck axles	Tender Truck axles	Side rods	Main rods Front	Main rods Back	Eccentric rod back	Valve gear	Link block	Booster idler gear
2-6-6-4	6-6	Freight	35	35	35	35	35	0	0	0	25	29	0	0
2-6-6-6	6-6	Freight	45	35	35	35	35	0	0	0	0	45	0	0
2-6-6-6	6-8	Freight	8	45	45	0	0	0	0	0	0	45	0	0
2-8-0	4-4	Freight	72	8	8	0	0	0	0	0	0	0	0	0
2-8-2	4-4	Freight	49	0	2(1)	0	0	0	0	0	0	0	0	0
2-8-2	6-6	Freight	266	20	28	3	3	3	0	0	4	32	4	17
2-8-4	4-4	Freight	1	1	18(2)	1	1	0	0	0	0	0	12	0
2-8-4	6-6	Freight	126	0	0	0	0	0	0	0	0	0	0	1
2-8-8-0	6-6	Freight	25	100	108(3)	70	24	0	0	0	0	100	0	55
2-8-8-2	4-4	Freight	3	0	25	0	0	0	0	0	0	0	0	0
2-8-8-2	6-6	Freight	70	0	0	0	3(6)	0	0	0	0	0	0	0
2-8-8-4	4-10-0	Freight	18	70	70	70	25	0	0	0	0	46	0	0
2-8-8-4	6-6	Freight	42	18	18	18	18	0	0	0	0	18	0	0
2-10-0	8-8	Freight	598	42	42	42	30	0	0	0	30	30	30	0
2-10-2	4-4	Frt. & Switch	62	0	0	0	28	0	0	0	0	0	0	0
2-10-2	6-6	Frt. & Siwtch	237	10	0	0	2(7)	0	0	0	0	14	0	0
2-10-4	6-6	Freight	160	55	23(4)	8	15(8)	0	0	0	0	7	0	7
2-10-4	8-8	Freight	150	30	30(5)	0	36(9)	0	18	0	0	10	0	47
4-4-4	4-4	Passenger	25	25	25	25	150	0	0	0	25	25	25	125
4-4-2	6-4	Passenger	4	25	0	5	5	0	0	0	0	0	0	0
4-6-2	4-4	Passenger	611	4	4	4	4	0	0	0	0	0	0	0
4-6-2	6-6	Passenger	352	309	7(1)	13	19	1	1	1	0	32	0	18
4-6-4	4-4	Frt. & Pass.	15	222	31	29	47	1	1	1	0	1	21	0
4-6-4	6-6	Passenger	377	8	5	5	2	0	0	0	0	5	0	0
4-6-4	4-10-0	Passenger	57	368	71	90	300	5	5	5	0	92	10	8
4-6-6-4	4-10	Frt. & Pass.	99	57	48	47	57	6	6	6	0	13	0	0
4-6-6-4	6-6	Frt. & Pass.	136	99	99	99	99	0	0	0	71	71	71	0
4-8-2	4-4	Frt. & Pass.	96	136	74	89	89	0	0	0	0	0	0	0
4-8-2	4-10	Freight	3	19	10	10	1	0	0	0	27	56	27	0
4-8-2	6-6	Frt. & Pass.	544	3	0	0	3	0	0	0	0	0	0	0
4-8-2	8-8	Freight	150	222	125	167	300	0	110	0	0	85	26	15
4-8-2	10-4	Freight	5	10	0	0	109	0	0	0	0	0	0	0
4-8-4	4-4	Passenger	5	5	5	5	5	0	0	0	0	0	0	0
4-8-4	4-10	Frt. & Pass.	43	5	0	0	0	0	0	0	0	0	0	0
4-8-4	4-10-0	Frt. & Pass.	20	43	43	43	43	0	0	0	25	25	25	0
4-8-4	6-6	Frt. & Pass.	631	20	20	20	20	20	20	20	0	20	0	0
4-8-4	8-8	Frt. & Pass.	52	537	414	482	435	11	47	11	11	178	55	76
4-8-8-4	4-10	Freight	25	52	52	40	40	2	16	2	40	40	40	0
4-4-4-4	8-8	Passenger	15	25	25	25	25	0	0	0	25	25	25	0
4-4-6-4	8-8	Freight	26	15	15	15	15	15	15	15	0	0	0	0
4-6-4-4	8-8	Freight	1	26	26	26	0	0	0	0	0	0	0	26
6-4-4-6	8-8	Passenger	1	1	1	1	0	0	0	0	0	0	0	1
0-8-6	8-8	Passenger	1	1	1	1	1	0	0	0	0	0	0	0
				1	1	1	1	1	0	0	0	0	0	0
Totals			5,261	2,672	1,554	1,489	1,990	65	239	61	283	999	371	396
Miles—1945				204,888,882	121,881,208	123,434,166	160,222,843	4,196,283	20,515,625	4,157,889	26,083,435	77,256,946	33,113,335	19,461,002
Locomotive failures—1945				29	16	16	157	1	0	0	0	2	0	0
Miles per locomotive failure—1945				7,065,134	7,617,576	7,714,635	1,020,528	4,196,283				38,628,473		

Note: Of 107 railroads reporting, 52 reported some steam locomotives equipped and 55 reported no steam locomotives equipped with roller bearings.

(1) Main drivers only.
(2) Main drivers only on 17.
(3) Main drivers only on 8.
(4) Main drivers only on 15.
(5) Main drivers only on 10 and others have No. 3 and No. 4 drivers only.
(6) On booster truck only.
(7) Back truck only.
(8) Back truck only on 6.
(9) Booster truck only on 8.

of the Diesel locomotives to various classes of service were included in separate mimeographed forms as part of the report presented at the meeting. A third table giving cost figures for various horsepowers was presented verbally at the meeting by A. G. Hoppe, general superintendent locomotive and car departments, C. M. St. P. & P. In addition, Tables I and II, summarizing the applications and performance of roller bearings to Diesel and steam locomotives, respectively, were presented with the report to bring that data up to date.—*Editor.*]

Diesel Standardization

The sub-committee has had several meetings during 1945 in an attempt to reach some conclusions as to the possible standardization of Diesel locomotive parts and in the work of the past year has concentrated primarily on trucks for 600-h.p. and 1,000-h.p. switching locomotives. The bulk of the locomotives has been furnished by four builders which in the following will be designated as Builders A, B, C, and D.

War-time conditions brought about some measure of standardization in that the truck frames used by Builders A, C, and D are identical except for the motor nose suspension brackets and the air inlet openings for traction motor ventilation. Builder B has used and is still using a radically different truck for this purpose. This has resulted in three builders using the same wheels and axles. The axle is the American Transit Association axle No. E-12-X for 6½-in. by 12-in. journals as shown in Fig. 1.

Journal boxes are not identical in each case, but they are interchangeable assemblies. The standard A. A. R. 6½-in. by 12-in. journal bearing and wedge can be used with journal boxes arranged for such parts. For railroads desiring the extended bearings, the standard A. T. A. 6½-in. by 12-in. bearing is

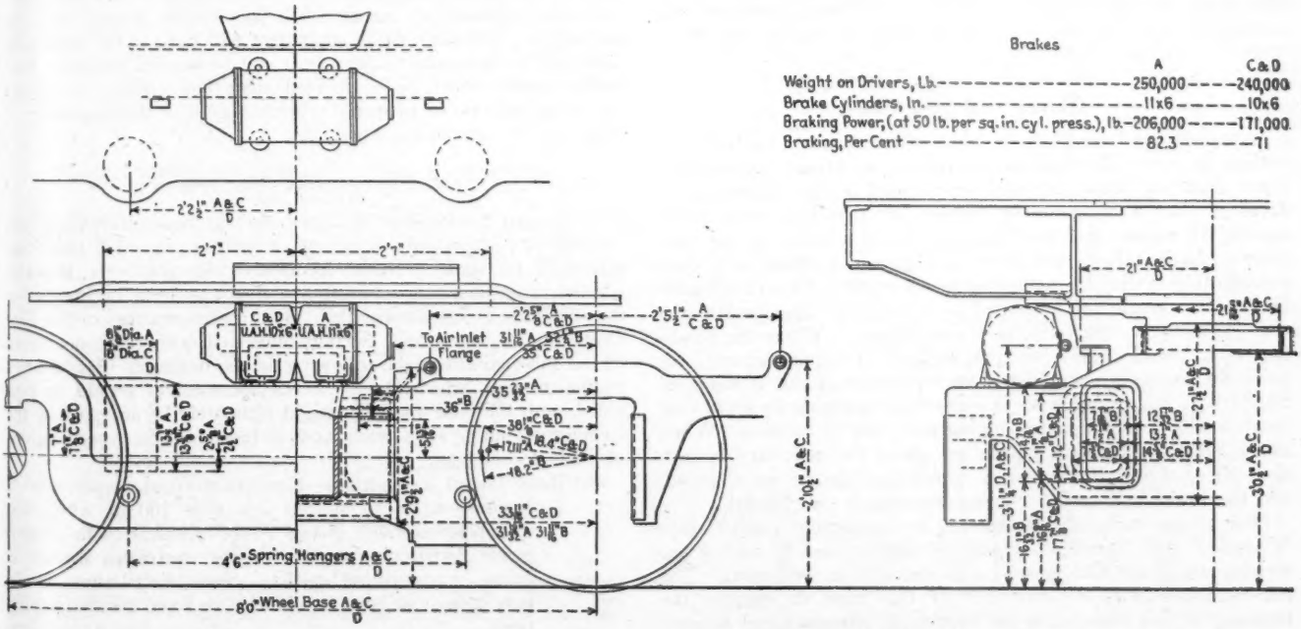

Brakes
A
C&D
Weight on Drivers, Lb. 250,000 240,000
Brake Cylinders, In. 11x6 10x6
Braking Power, (at 50 lb. per sq. in. cyl. press.), lb. 206,000 171,000
Braking, Per Cent 82.3 71
To Air Inlet Flange
4'6" Spring Hangers A & C D
8'0" Wheel Base A & C D

Fig. 3—Interchangeable truck for 600-hp. and 1,000-hp. Diesel switching locomotives

available. This is practically identical with the A. A. R. 6½-in. by 12-in. except for the extension of the bearing area. Builder A uses a bearing which conforms to neither the A. A. R. or the A. T. A. bearings, having been modified to provide somewhat greater area between the sides of the brass and the lugs in the box. Fig. 2 shows the dimensions of these two bearings for 6½-in. by 12-in. journals, the dimensions of the standard A. A. R. 6½-in. by 12-in. bearing being shown on page 24 of Section D of the Manual of Standard and Recommended Practices. Builder B, in addition to using an entirely different truck, also uses 7-in. by 14-in. journals with the appropriate A. T. A. type of journal bearing. Thus far, therefore, railroads owning locomotives manufactured by Builders A, C, and D, are able to standardize the axle and wheel stock for such locomotives. To date Builders C and D have used the same electrical equipment and owners of locomotives of these two types have interchangeability of complete trucks.

In several discussions with the motor manufacturers the sub-committee was advised that it was virtually impossible to make the three types of traction motors under discussion electrically interchangeable. Mechanical interchangeability of motors is now prevented by the location of the motor nose suspension lugs, the shape and size of the traction motor ventilation opening in the truck bolster, and by differences in gearing. Two of the motor manufacturers agreed to discuss the possibility of making the motors mechanically interchangeable by the use of identical gears. After several meetings on the subject they advised that since it was not the intention of either manufacturer to make any changes in traction motors for this service at this time, it would be impossible to carry out the suggestion of the sub-committee. They did, however, agree that if either manufacturer brought out a new traction motor he would consult with the other so that eventually there might be some possibility of having motors mechanically interchangeable.

A drawing has been prepared and shown as Fig. 3 which shows the essential dimensions of an interchangeable truck for 600- and 1,000-h.p. Diesel locomotives. As indicated previously, the truck is now used on locomotives of three of the manufacturers and with modifications in the underframe could be adapted to locomotives of Builder B. The drawing shows the gear center distances and also the situation with respect to motor suspension lugs. It is to be noted with respect to these lugs that the difference is entirely in the horizontal locations. So far as vertical location and vertical spread between the lugs is concerned, the differences are insignificant for all four builders. The situation with respect to the traction motor ventilation openings is shown in the sectional view of Fig. 3. It appears entirely possible that with the use of a suitable adapter plate, a standard opening could be provided in the bolster to accommodate the size, shape, or location of any of the three types of openings shown. This opening would be 14-7/16 in. vertically by 10 in. horizontally, with the bottom edge 16 in. above the rail and the inner vertical edge 12½ in. from the center line of the truck. The motor nose suspension lugs could be so designed as to provide for a standard casting, having the longest motor nose support lug so as to accommodate the shortest traction motor. The railroad or locomotive builder buying such trucks could then accommodate the type of motor to be used by cutting off the lugs to the appropriate dimension and providing the necessary adapter plate for the motor ventilation. Such a move would enable the casting manufacturers to put through a standard casting in more or less job lots, with a resultant reduction in price.

Summarizing the above—the situation with respect to 600-h.p. and 1,000-h.p. Diesel switchers at the present time is as follows:

1—Three builders now use essentially the same truck which, while it is mechanically interchangeable as a whole, cannot be interchanged because of differences in electrical characteristics of the traction motors. It is more or less a matter of coincidence that two of the builders have completely interchangeable trucks

merely because they happen to use the same type traction motors.

2—The E-12-X axle can now be used interchangeably on locomotives built by Builders A, C, and D.

3—Journal boxes adapted for standard A. A. R. 6½-in. by 12-in. bearings employing either the A. A. R. or the A. T. A. standard 6½-in by 12-in. journal bearing, or alternately, the complete journal box or bearing of Builder A can be used interchangeably on these three types of locomotives.

4—Interchangeability of complete wheel and axle assemblies is now prevented by the use of different gears on the various types of traction motors.

5—There appears to be no likelihood of any of the traction motor manufacturers involved to change either the dimensions or the electrical characteristics of their product, so that complete mechanical interchangeability of the trucks can be obtained or even complete interchangeability of wheel and axle assemblies.

The builders of Diesel locomotives in their efforts to reduce the cost of this type of motive power have, of necessity, been forced to adopt certain standards and adhere to them so that the Diesel locomotive could be built under mass production methods. It is unfortunate that each locomotive builder arrived at his existing standards independent of the other. Having done so, they are, of course, very reluctant to make any radical changes to standardize any parts as between the various builders. The situation as found on the switch engines is also present on road locomotives where it is further complicated by the fact that such locomotives use roller bearings. Three manufacturers of roller bearings for this service have again independently designed axles and bearings, with the result that standardization of these parts appears impracticable. Furthermore, ideas with respect to road locomotive trucks vary considerably as between the several builders, and for each builder as between the locomotives for freight and passenger service. It appears at present that about the only way in which an individual railroad can accomplish any measure of standardization is to buy the locomotives from one source only.

Classified Repairs

A request has been made by some of the member roads for an outline to cover classification of repairs to Diesel locomotives. Upon inquiring from railroads represented on the committee, it develops that a considerable number of railroads contemplate making all repairs to Diesel locomotives on a more or less progressive basis, using spare parts and spare assemblies to a very considerable extent. In making ordinary running repairs, cylinder liners, for example, are examined and changed progressively at the time of monthly, quarterly, and annual tests. When the condition of a Diesel engine becomes such as to require general repairs, the engine is removed and an overhauled engine is installed. Similarly, truck maintenance is carried on continuously by having spare trucks available and changing them out in rotation. When this is done the traction motors are given the necessary inspection, changed out if necessary, wheels are turned or changed, and the brake and spring rigging thoroughly overhauled.

[For those railroads interested in separating repairs into "classified" and "running", a detailed outline used by one of the member roads for that purpose was included in the report. The sub-committee was not prepared at this time to suggest the insertion of this material in the Manual of Standard and Recommended Practices.—*Editor*]

Another member road indicated its practice more briefly as follows:

"UC repairs unclassified: Locomotives which are placed in or awaiting shop for repairs requiring six days or more to complete.

Class A Repairs: Three year annual when the locomotive is to be given a general overhaul (engine, chassis and electrical) including the main generator.

Class B Repairs: Yearly annual when the locomotive is to be given a general overhaul (engine, chassis and electrical) exclusive of the main generator."

Inasmuch as there seems to be rather limited demand for setting up a definite outline for classification of repairs, it is the thought of the sub-committee that this be published as information for the guidance of such railroads as wish to follow this system.

Fire-Prevention Fundamentals

The subject of fire protection has been assigned to the sub-committee for joint consideration with a sub-committee from the Fire Protection and Insurance Section.

In the majority of Diesel electric road locomotives built to date very little attention was paid in the design to simplify good housekeeping which is a fundamental in fire prevention. In future designs this feature should receive more attention and the cooperation of the Diesel manufacturers should be sought in improving this item. Some specific instances are as follows:

1—Superstructure: Existing design employing channels in the side frames have undesirable pockets at the bottom connection of braces to post, and also behind fixed equipment such as control cabinets, oil tanks, fuel pumps, etc. This could be eliminated by applying a light sheet metal inside lining to a height of approximately four ft., the inside lining to be equipped with a top sloping about 45 deg. Where the space in the side frame is utilized by cabinets, etc., the inside lining should be fitted neatly around such cabinets.

2—Compartments under cab floors: Such compartments should be closed off with suitable doors or panels which can be of wire mesh if ventilation of such space is necessary.

3—Nose: Suitable metal containers should be provided for fuses. torpedoes, flags, and spare light bulbs, such containers to be permanently installed in the nose. Rerailing equipment such as frogs. chains, emergency knuckles, if carried in the nose, to be suspended from suitable brackets so that they may be kept off the floor.

4—Oil leakage: Suitable metal drip pans with drains extending below the bottom edge of the water and fuel tanks should be provided to dispose of oil leakage from engines and prevent such leakage from spreading in the engine-room.

5—Pipes and conduits: Wherever practicable, pipes and conduits should be sufficiently off the floor to permit thorough cleaning underneath the pipes.

6—Underneath equipment: Every effort must be made to avoid pockets or spaces underneath the locomotives where dirt, particularly combustible matter such as leaves, grass, etc., can accumulate. The underneath equipment will have to be specifically designed for accessibility so that it can be readily cleaned. Fuel tanks should either be so located that they cannot be injured by flying objects, or properly protected against the possibility of such objects puncturing the tanks.

Fire-Protection Equipment

In the past the builders of Diesel-electric locomotives have considered fire-protection equipment a matter for the individual railroads to settle. Basic locomotive specifications provided wholly inadequate fire protection and it has been necessary for the railroads to supplement this. The representatives of the Fire Protection and Insurance Section suggested, with the concurrence of the sub-committee, the following as the minimum of protective equipment with which Diesel-electric locomotives should be provided, with the hope that this might ultimately be accepted by the locomotive builders as such and included in the specifications of their locomotive:

(a) Road Diesel locomotives—Equipment required per unit:

1—Inside—engine room—not less than 100 lb. of carbon dioxide, preferably in two 50-lb. cylinders, with appropriate distributing means, or the equivalent thereof in other extinguishing media. Such distributing means may consist of hose, hose racks, or fixed nozzle installations.

Operating cab—Not less than one-quart carbon tetrachloride or equivalent extinguisher.

2—Outside—Two hundred (200) gallons of water available solely for fire-protection purposes propelled by carbon-dioxide, with a foam proportioning tank and for each such installation one 100-ft. length of 1½ in. diameter hose complete with play pipe nozzle on each side of locomotive or, as an alternate, the use of water alone and a hose equipped with fog nozzle.

(b) Switch Engines: One 50-lb. carbon dioxide cylinder, or the equivalent thereof, in other extinguishing media, complete with 50 ft. of hose.

The foregoing are to be considered minimum requirements and may, of course, be expanded to any extent desired by the individual railroads. Additional equipment would include thermostatic alarms installed above each Diesel engine and connected to the alarm system for hot engines, with a suitable light indication to identify the cause. Smoke detector systems can be installed beneath the body to detect the presence of fire over the trucks and in the battery boxes. In addition, suitable means should be provided to protect the oil tank against flying objects.

It is the intention of the joint sub-committee to keep in touch with the basic subject of fire prevention and protection on Diesel locomotives and make reports from time to time on the progress in this important feature of Diesel locomotive operation.

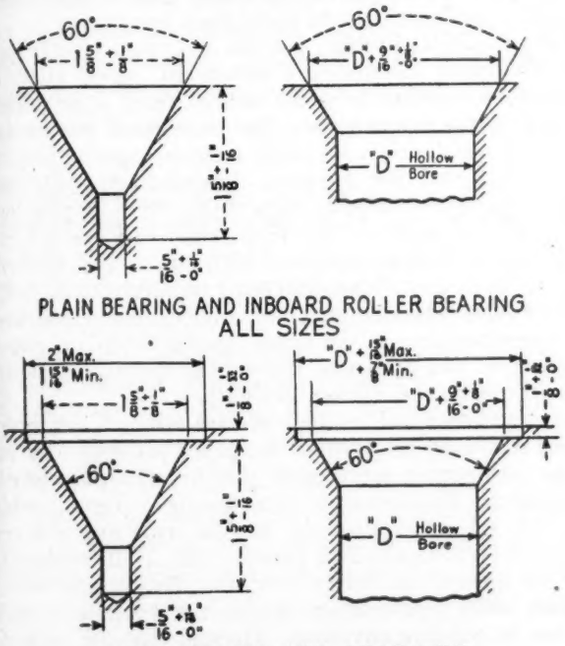
Locomotive Design

Piston Valves

The standardization of grooves and rings for piston-valves was first introduced in 1941, and was held in abeyance account of the war. Recently, it was decided by the committee to reconsider the subject and to handle it to a conclusion. A questionnaire data sheet is now being prepared, and when completed it will be submitted to various railroads to determine the number of different sizes and styles of ring grooves and rings now being used in piston valves, with a view of standardizing them.

Axle Centering

After A.A.R. Manual page D-4B-1945, covering various car axle centering, was adopted, it was suggested that similar consideration be given to axles used on locomotives. The sub-committee has prepared a new page (Fig. 4) to be inserted in



Note: Depth of counterbore in rough axle shall be increased from that shown to compensate for stock allowed to face axle. When a plug is used in the end of hollow axles, the center in the plug should be the same as that shown for solid axles.

Fig. 4—Finished dimensions for locomotive axle centering

Section F of the Manual to show axle centering for solid and hollow-bored axles for both plain and roller bearings. The committee recommends that one size of lathe center, 1⅝-in. diameter, be adopted for all sizes of axles, disregarding the 1¼-in. diameter as shown on Manual page D-4B-1945, for axle sizes "A", "B", "C", and "D" only.

It is recommended that this be submitted to member roads by letter ballot for inclusion in the Manual as recommended practice. It is also recommended that pages F-99, F-100, F-101 and F-102 of the Manual of Standards and Recommended Practices be revised to agree with the proposed centering as shown in Fig. 4.

Determining Weight Distribution

The sub-committee was requested to prepare proposed changes in the A.A.R. Manual to include locomotive springs applied directly over or under journal boxes, so that the springs would be considered "dead weight" instead of "suspended weight". This will require re-working of pages in the A.A.R. Manual as follows:

Page F-189-1936:

1—Fourth paragraph changed by re-wording as follows: "By 'dead weights' is meant the weight of all parts below the spring rigging, and therefore not supported by the spring rigging *and to include the weight of springs located directly over or under journal boxes.* The total dead weight must be determined for each pair of wheels separately and for driving wheels in the sum of the individual weight as follows:

2—To items on driving wheels add: "2 springs when located directly over or under journal boxes."

Page F-190-1936:

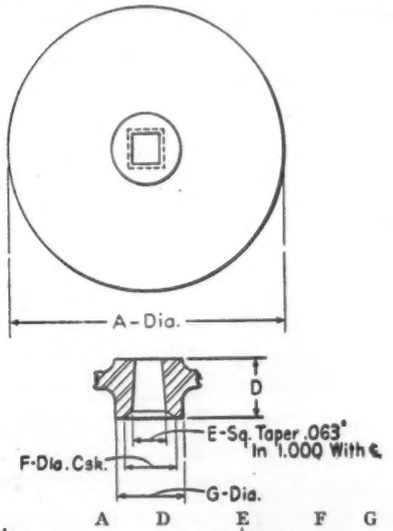
1—To items on trailer truck add: "2 springs, when located directly over journal boxes."

Wheel Slide Control Devices

This subject has recently been added to our docket and the request made that three members of the sub-committee collaborate with the Car Construction Committee in a joint study with the representatives of manufacturers with respect to standardizing the application of control or other similar devices to locomotive and tender journal boxes.

Valve Handwheels

The 1945 report of the committee included reference to a proposed revision of the drawing on Page F-171 of the Manual, which shows the standard design of handwheels for globe and angle valves for 300 lb. per sq. in. pressure. This revision has now been prepared and is submitted herewith as Fig. 5. The revised drawing shows the outside diameter for each size of valve



Valve size	A	D	E Max.	E Min.	F	G
¼	2.813	.438	.328	.324	.453	.688
⅜	2.813	.438	.328	.324	.453	.688
½	3.000	.484	.359	.355	.500	.781
¾	3,438	.531	.406	.402	.531	.781
1	4.375	.688	.500	.496	.688	1.031
1¼	4.875	.750	.531	.527	.750	1.125
1½	5.313	.781	.563	.559	.781	1.156
2	5.813	.938	.625	.621	.875	1.344
2½	6.375	1.000	.688	.684	.938	1.438
3	6.750	1.125	.750	.746	.969	1.531

Note: All dimensions in inches and all except E have a tolerance of ± .031 in.

Fig. 5—Handwheel for globe and angle valves

and also the dimensions for the stem fit, but with no detail for the design of the wheel itself, thus permitting the user to specify the required design or to accept the manufacturer's standard.

Tires

The A.A.R. Locomotive Tire Manual of Recommended Practices adopted in 1937 was re-edited and brought up-to-date in preparation for the publication of a new edition.

All-Welded Boilers

To date there have been three locomotive boilers built by the fusion welding process. One 2-8-0 type boiler was built for the Delaware & Hudson in 1937 and two 4-6-2 type boilers were built for the Canadian Pacific in 1945. Fusion welded boilers on order include ten 4-8-4 type boilers for the Chicago, Milwaukee, St. Paul & Pacific, six 4-6-4 type for the Chicago & Northwestern, one 4-6-4 type for the New York Central and one 4-6-6-4 type for the Delaware & Hudson.

[In a summary of the performance of the D. & H. all-welded boiler built in 1937 the report showed that this boiler had made approximately 372,565 miles up to April 1, 1946, with no work having been done on the boiler shell because there has not been a semblance of weakness in the welded seams or in any other parts of the shell construction.—*Editor*]

Seal Welding of Staybolts

While seal welding of staybolds to firebox side sheets has not been standardized on the railroads, progress has been definitely made along this line. Several of the leading railroads have requested and have been granted permission to seal weld staybolts to firebox side sheets for test purposes and seal-welded staybolts have been applied to locomotives that are in the most severe service, some of these having made approximately 170,000 mlies. Some roads claim that this will greatly prolong the life of firebox side sheets and eliminate leaking staybolts to a great extent.

The regular method of applying staybolts is followed with the exception that the surface around the staybolts is cleaned to a bright finish to insure a proper weld. The staybolts are applied from the outside, extending two threads through on the firebox side. An air dolly is then used on the fire side while the outside is being driven with a pneumatic hammer. A ⅛-in. covered electrode is then used with one pass, making a continuous weld where possible. This application has so far proven very satisfactory on one railroad, eliminating all leaks on their boilers carrying a pressure of 275 lb. per sq. in.

One railroad has reported that they have equipped side sheets of four locomotives in this manner. The bolts were run in in the usual manner so that the ends of the bolts project approximately 5/32 in. through the sheet after hammering. To date there have been no leaky staybolts in any of these locomotives since they were equipped and no cracks have developed in the side sheets.

The seal welding method of applying staybolts has not, as yet,

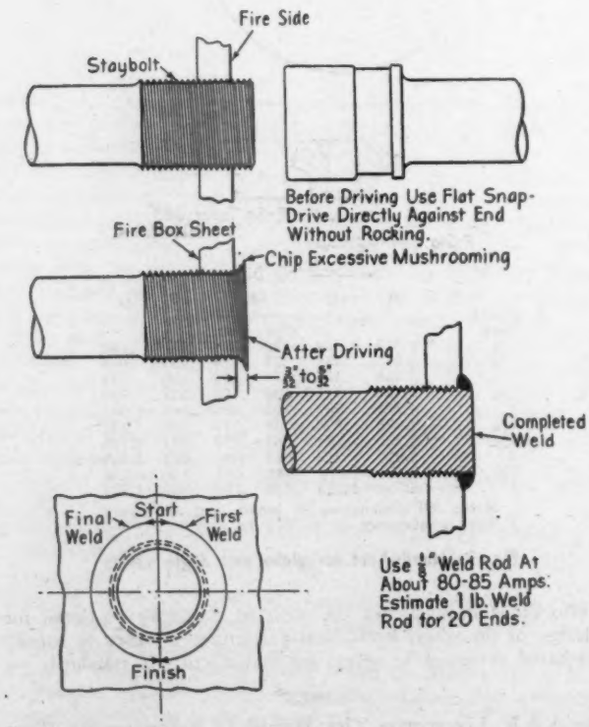


Fig. 6—Recommended procedure for driving and seal-welding staybolts on the fire side

been adopted as standard on any railroad as it is necessary to secure permission of the Interstate Commerce Commission.

The following procedure has been used when making this application:

1—Provide staybolts of such length as to give an extension beyond the fire sheet of 3/32 to 5/32 in. after hammering.

2—Apply the screwed stay in the regular manner and to the existing standard for thread fits.

3—Hammer with a flat snap straight against the end of the bolt following the regular practice for holding on, double gunning or bucking up.

4—Seal weld by approved practice in lieu of beading.

Fig. 6 shows a recommended procedure.

Discussion

In discussing fire protection for Diesel locomotives it was suggested that the equipment requirements could be decided best only if the origin of the fires could be determined and this had been almost impossible in many instances because the evidence was destroyed. The need for 200 gal. of water for fire-fighting purposes also seemed to be a problem because of the need for utilizing all water-carrying capacity for other purposes. Another suggestion was that the committee recommend the location of the fire-fighting equipment because its location would make a difference in its availability during a fire.

The Diesel cost figures presented by Mr. Hoppe during the meeting were reviewed by a member who pointed out some obvious discrepancies in the figures as quoted. In reply, Mr. Hoppe told of the difficulties met in obtaining the data and in interpreting them after they were received. He had considerable doubt about their accuracy.

John M. Hall, director, Bureau of Locomotive Inspection, Interstate Commerce Commission, called attention to the poor visibility from the cabs of many large designs of new steam locomotives. He mentioned the expertness with which designers build in steam capacity and improvements and the apparent forgetfulness they have in considering the visibility required for the men who have to run the locomotive. Mr. Hall reviewed a specific case in which a railroad cooperated with him in the construction of its largest locomotive and the result was better visibility than that obtained on many smaller locomotives. He suggested that in the future special attention should be given to this particular phase of locomotive design in order to provide maximum visibility.

In discussing the matter of the welded locomotive boiler, Mr. Hall referred to the paper presented by him at the last spring meeting of the American Society of Mechanical Engineers at Chattanooga, Tenn., which set forth the position of the bureau regarding the construction of fusion-welded boilers. Mr. Hall emphasized that the bureau has not granted any blanket approval of welded boiler construction and is not permitted under the law to approve anything. He said that the railroads must make application for permission to build or have built boilers of that type, filing with the application detailed drawings and specifications. The specifications must include all the known safe practices now used, especially those contained in the A. S. M. E. locomotive boiler code. Permission will be granted in individual cases only after such an application has been filed. The railroads must not build welded boilers in their own shops, said Mr. Hall, without having first made application for permission to do so, for such shops are seldom equipped with the necessary facilities for meeting the requirements of the welded type of construction. Both X-raying of every inch of the welds and stress-relieving of the boiler after welding are essential in the construction of fusion-welded boilers. Furthermore, Mr. Hall emphasized the fact that no rewelding of the boiler will be permitted after the boiler has been stress-relieved and if it develops a defect after delivery to a railroad it must be repaired with a riveted patch with the proper factor of safety.

In discussing the seal welding of staybolts, Mr. Hall directed attention to the fact that the permission to perform such work is in the case of new work only and that no welding is allowed in repairing defective staybolts.

(*The report was accepted and the recommendations ordered referred to letter ballot.*)

EDITORIALS

Let Us Define The Objective

In recommending, as a letter ballot item, a revision of Paragraph 355(b) of the Wheel and Axle Manual with reference to the form of lathe tools for performing finishing operations on axle collars, journals and wheel seats, the sub-committee seems to have followed the principle of some of our lawmakers with respect to existing laws that have either outgrown their usefulness because they were inadequately written in the first place or bcause the conditions under which they were written have changed, namely, that of attempting a broadening revision to correct an original inadequacy while at the same time perpetuating the original wording of the "law" or rule.

Before adding the somewhat superficial wording of proposed form for Par. 355(b) might it not have been a good idea to examine the background of experience that caused that paragraph to have been written in the first place? Back of that paragraph, along with all of the other recommendatory sections of the Wheel and Axle Manual was a real need—that of bringing to a universal high standard the charcter and quality of wheel and axle work as performed in the many railroad shops throughout the country. Of that need there can be no doubt—it existed then and it exists today. While many, if not most, shops have improved the quality of wheel and axle work there are many shops that, at times, turn out some pretty poor workmanship.

What the Wheel Committee originally wanted—and still wants—is to establish a standard of workmanship that, by experience, will reduce equipment failures, and accidents resulting therefrom, to a minimum, and to educate the shop forces on all railroads as to the methods by which that high standard can be met. As a result of experience, over a period of several years, the committee found that, on the type of machine tools that had come to be accepted as more or less conventional, if not traditional, in the wheel shop, a certain tool type and form could produce the quality of finish required—given a good machine tool and a good workman behind it.

Now, along come major developments in both machine and tool design—developments that are radical both in the manner of doing the work and in the character of the results that may be obtained. These developments come to the railroad industry at the outset of an era in which that industry may hope to profit by many of the new ideas that have come about as a result of the war experience in production industries. The few new developments in wheel and axle machines and tools that have so far been offered to the railroad industry are but the forerunners of radical changes that may come in the near future.

So, in framing a revision to Par. 355(b) might it not be well to explore the possibilities of putting into definite words, for inclusion in the Wheel and Axle Manual, an accurate definition of the *specific results* that a wheel shop supervisor and mechanic are expected to produce in the way of quality of workmanship on axle (and wheel) machining operations and then offer, as guidance, recommendations as to facilities that will materially assist in producing those results? The weakness in the present wording of the paragraph in question is that it recommends a tool form adaptable only to a type of machine that may rapidly become obsolete and the proposed revision of the paragraph is of such a general nature that it seems to throw the whole question wide open because it still has not defined the ultimate objective, namely, the standard of quality required.

Freight-Car Needs

Elsewhere in this issue is an abstract of the brief but pointed remarks by W. J. Patterson, member of the Interstate Commerce Commission, before the annual meeting of the A. A. R. Mechanical Division at Chicago. Commissioner Patterson complimented the officers and members of the division on the successful maintenance of rolling equipment to handle peak traffic loads during the war period, but explained that wear and gradual deterioration due to the intensive use of equipment are now causing train delays and an increasing number of failures. He said that now is the time to help restore railroad efficiency by instituting a program of retirement for about 25 per cent of the 500,000 freight cars which are more than 25 years old and installing as rapidly as possible upwards of 150,000 new freight cars, most of which are long overdue.

A study of freight-car conditions early this year indicated, in the categories of box, hopper and gondolas alone, the desirability of retiring a total of about 80,000 cars, or less than 20 per cent of these cars which are now over 25 years old. As of the first of the year there were on order with builders and in company shops 32,000 cars of the types mentioned and the study pointed to the need for further orders of about 94,000 cars, 12,000 of which should be placed during 1946 and the balance probably in 1947.

In this connection, it is interesting to note that orders

for box, automobile, hopper, covered hopper and gondola cars for the first half of 1946 for domestic use totaled about 12,250 cars. As of July 1, 1946, there were still on order 34,000 cars of these types, 7,700 of which were to be built in railroad shops.

During the 10 months ended May 31, the Class I roads retired 32,181 box cars, 13,986 gondolas and 10,961 hopper cars. Offsetting these retirements have been installations of 21,930 box cars, 4,387 gondolas and 9,851 hopper cars. The average installation of 3,600 cars a month has included 2,860 cars designated as new cars and may be assumed to be the cars received from the builders' plants and built new in railroad shops. This production of about 2,500 cars a month from the plants of the various builders is said to represent less than 20 per cent of the estimated full-time car producing capacity of private builders.

In an address on April 25 before the New York Traffic Club, E. G. Plowman, vice-president, United States Steel Corporation analyzed the freight-car situation and specified five factors militating against any easy car supply, viz.: poor car condition; declining effectiveness of heavy loading requirements; prevalence of the five-day week in industry; resort to government priorities in loading and the return to peace-time competitive conditions, both in industry and on the railroads. He pointed out that the change to peace-time operation automatically established a condition wherein shippers and receivers would not pay for overtime loading and unloading as they had done during the war and, as a result, the total number of cars required to handle peace-time business must be larger than would be true under war-time conditions.

Mr. Plowman suggested the return to the pre-war car service rules requiring cars to move to home lines upon the assumption that, regardless of difficulties of securing lumber and steel, cars could be repaired at a more rapid rate on railroad repair tracks if the cars were the railroads' own equipment. He added that there would be an improvement in car purchasing policy in that the types of cars acquired would more closely meet the present needs of on-line shippers if cars were released more promptly by foreign lines and returned to the owning roads.

Two important uncertainties stand in the way of early improvement in the freight car situation—earnings and materials. All through the war period the government demanded and received the highest conceivable performance in the matter of rail transportation to back up our armed forces with men and materials. While this was going on government agencies were particularly niggardly in the matter of priorities for materials and supplies for the rehabilitation and replacement of railroad equipment including freight cars.

When consideration is given to the specific need for large quantities of new freight cars within the next 12 months and quantity orders for steel and other materials are being quoted for delivery in 1947, it is apparent that certain controlling conditions will have to be changed. Why talk about the government buying 50,000 cars and leasing them to the railroads when a more sensible approach would be to concentrate upon the obstacles that every one conversant with the situation knows exists. Once these obstacles are removed, once adequate earnings and adequate materials and supplies are assured, neither the railroads nor the car building industry need any help to do a job which is well within their demonstrated capacity.

The railroads, with the cooperation of the shippers, came through the war successfully despite the war-time failure of the government to recognize their desperate need for more equipment and more materials. But they came through, so near the end of their rope with respect to freight-car supply that the deficiency of transportation caused thereby is slowing up reconversion and will continue to do so until the freight-car deficiency is remedied.

Locomotive Safety

Speaking on safety, a subject of interest to every railroad man and of particular interest to himself, J. M. Hall, director, Bureau of Locomotive Inspection, Interstate Commerce Commission, touched on three aspects of locomotive design and construction in his remarks at the A. A. R. meeting at Chicago. All of them can be mentioned again here without overstressing because safety is a subject that requires continual reemphasis if the railroads are to retain their place as the leader in safe transportation.

First, Mr. Hall discussed the relation of the design features of large steam locomotives to the visibility afforded the enginemen operating the locomotives. He mentioned that the combined efforts of the Bureau and a railroad produced better visibility in that railroad's largest locomotives than in many locomotives of considerably smaller proportions. It was a demonstration that design features such as the location of cab windows, running boards and appurtenances draped around the smokebox can be important factors in the minimum distance ahead that can be seen by the engineman in the cab. The ability to see track conditions ahead of a moving locomotive under all circumstances is a requirement for the safe operation of any train and it should be considered as fully as any of the other principal locomotive characteristics so carefully worked out by the designers.

Two items presented in the Locomotive Construction Report dealing with the use of welding in locomotive boilers were discussed by Mr. Hall. One was a restatement of the position of the Bureau with respect to the fabrication of boilers by fusion welding, the other was its position on the seal welding of staybolts. In both instances the Bureau is interested primarily in the safety of the boiler structure and it will not permit any practices to be employed that are known to be unsafe.

In fabricating fusion-welded boilers complete plans and specifications incorporating all the known safe prac-

tices, especially those contained in the American Society of Mechanical Engineers' locomotive boiler code, are required. The X-raying of all welds and the stress-relieving of the entire boiler after welding are procedures that must be observed. Because the fusion-welded boilers now on order (18 were listed in the report) are being constructed by a builder with the facilities for meeting all the requirements the actual construction of the boilers is perhaps of less concern to the railroads than the handling of the boilers after delivery. It was stressed that no rewelding of the boilers would be permitted in the repairs of any cracks that might possibly develop; they *must* be repaired by the use of riveted patches with the proper factor of safety. Based on the perfect performance of the first all-welded boiler, repairs of this nature are not expected but if defects do occur only repair procedures known to be safe must be followed.

The seal welding of staybolts is a development that, like the all-welded boiler, gives promise of being adopted as a means of improving the performance of the steam locomotive boiler. Like the all-welded boiler permission for its use must also be granted by the Interstate Commerce Commission before it can be applied. It is to be used in only new applications of staybolts, side sheets and fireboxes; it must not be used for repairing defective staybolts.

Another part of the Locomotive Construction Report that dealt with safety, but not mentioned by Mr. Hall, was the subject of fire prevention and fire protection for Diesel locomotives. There is no doubt about the need for improvements in the design of this type of motive power to permit better housekeeping and prevent fires as disastrous as some that have occurred. In addition better fire-fighting equipment is needed to combat the fires that do start. The report set forth recommendations for both preventive and protective measures against fires which should be followed as far as practicable.

The locomotives designed, built and equipped with safety in mind are the ones that can be depended upon to turn in the outstanding performances. They are the ones that have less chance of being hauled away for scrap after some disaster has overtaken them.

NEW BOOKS

MECHANICS FOR ENGINEERS—*By E. R. Maurer, R. J. Roark, and G. W. Washa. Published by John Wiley and Sons, Inc., New York. 425 pages, 5½ in. by 8¼ in. Illustrated. Price $4.00.*

This is a textbook on theoretical mechanics for students of engineering, and covers statics and dynamics on the undergraduate level. It is an outgrowth of previous books on mechanics by Maurer and Roark, and has been expanded to cover the field more thoroughly, especially in dynamics. Kinematics and kinetics are treated concurrently instead of separately, and the force-acceleration relationship is introduced early as an aid to the more complete understanding of acceleration. The methods of vector analysis have been used more generally in the discussion of curvilinear motion of a particle and of spherical and general motion of a rigid body. The d'Alembert principle receives greater emphasis in view of the increasing importance of such subjects as engine balancing and dynamic stress.

New topics that have been added to the usual subjects include virtual work and mechanical vibrations. In statics, increased emphasis is placed on problems that involve non-coplanar forces. To help the reader to determine whether his understanding of the subject matter is correct or not, numerical problems involving the use of the laws explained are included, and the answers to many are given.

A SET OF FIVE BOOKLETS ON DIESEL LOCOMOTIVES. *Published by the International Textbook Company, Scranton, Pa. Total of 584 pages, 4¾-in. by 7¼-in. Bound in Fabrikoid. Illustrated. Price $5.55.*

This set of books covers the principles, construction, operation, and maintenance of the Diesel and the electrical equipment on Diesel-electric locomotives. One booklet is devoted to a general discussion of the three types of Diesel locomotives and their characteristics and to a description of the trucks and draft rigging.

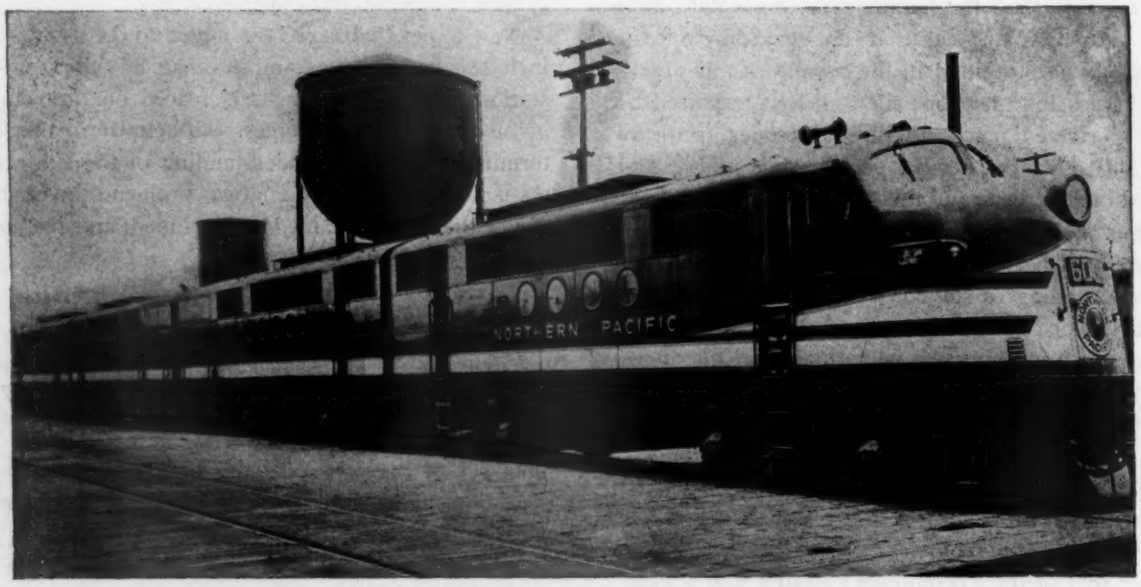
The book is written so that the material is easily understandable for the reader who has had little or no Diesel-electric experience, nor previous study in this field. The first volume explains the principles of operation of internal combustion engines, and the difference between the gasoline and the Diesel engine. Two- and four-stroke cycles are described. General features, such as valve timing, firing orders, crankshaft designs, injection systems, pre-combustion chambers, etc., are covered in this volume. The second half of this volume deals with the fundamentals of electricity, and describes the theory of electric current and circuits, storage batteries, magnetism, and d. c. motors and generators.

The second volume deals with the locomotive itself and its foundation equipment. There are chapters on switching, passenger, freight, and transfer locomotives, and on dynamic braking and ratings. The purposes of the locomotive equipment are explained. Articles on the trucks and draft rigging include descriptions of trucks, journal boxes and bearings, wheels and axles, motor drive, service instructions, draft gears and couplers.

The entire third booklet is devoted to a description of the two-cycle engine, using the General Motors model 567A as an example. The construction, operation and maintenance of all sub-assemblies is treated in detail. Similar descriptions of the electrical equipment for the Diesel locomotives are covered in the final two volumes. A sixth volume devoted to the four-cycle engine is being prepared.

Northern Pacific

Tests Radio on Freight Trains



The Diesel-electric locomotive which was used for the tests

Western Electric Company enters train communication field with VHF space-radio equipment

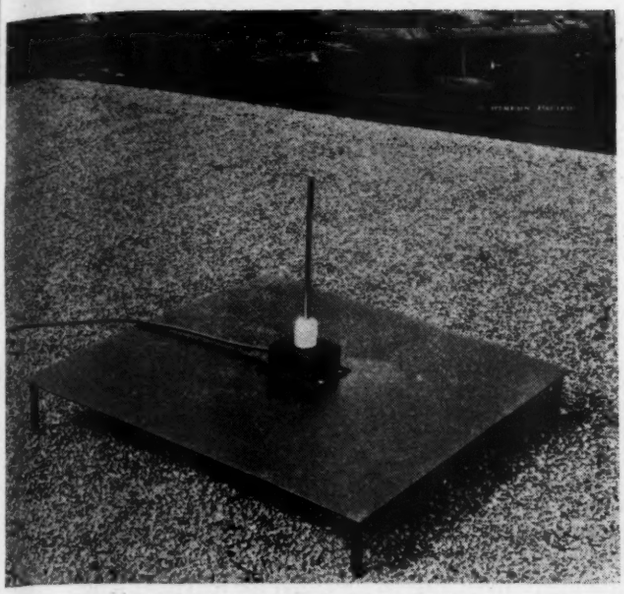
GREATER efficiency in railroad operations through the use of radio on freight trains is indicated following a comprehensive series of tests conducted in March and April by the Western Electric Company in cooperation with the Northern Pacific on a new type of very high frequency railroad radio equipment. The tests were made on runs between Seattle, Wash., and Yakima, about 145 miles over the rugged Cascade mountains and between Seattle and Portland, Ore., 180 miles. The new radio equipment was designed by Bell Telephone Laboratories to operate in the new 152 to 162 megacycle band, assigned to railroads by the Federal Communications Commission, and consists of a radio transmitter and receiver, hand-set type microphone with push-to-talk switch, loud-speakers and control unit, power supply comprising a generator and inverter, and a quarter-wave vertical antenna with ground plane.

Quarter-wave vertical antenna mounted on the locomotive cab

Installation of Equipment

For the first runs over the Cascades, similar equipment was installed in two 5,400-hp. Diesel-electric locomotives and in the business car of F. L. Steinbright, superintendent of telegraph of the Northern Pacific, who supervised the tests; while on the second set of runs, between Seattle and Portland, the equipment was transferred to a steam locomotive. For the train-to-wayside station testing, radio equipment was installed at the Diesel-electric engine house at Auburn, Wash.

Each of the radio receivers and transmitters was constructed on an individual chassis with its own protective



Fixed-station antenna about 50 ft. above ground on Diesel enginehouse, Auburn, Wash.

covers. For each mobile unit, a mounting plate was provided on which was mounted the receiver, transmitter and the dynamotor for supplying plate and filament power to the transmitter. Connections to both the transmitters and receivers were by standard multi-contact connectors.

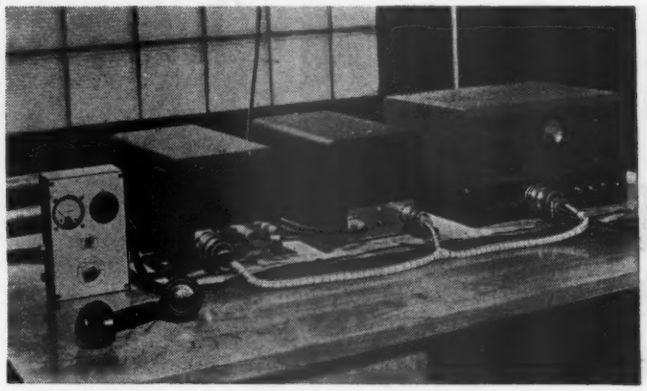
The control units consisted of a conventional Western Electric switch-hook, a power switch and two indicator lamps. One indicator lamp signifies application of primary power, while the other lamp indicates application of power to the transmitter. When the handset is lifted from the switch-hook of the control unit, the transmitter dynamotor is energized and the transmitter is thus prepared for push-to-talk operation.

Transmitters were rated at 20-watt output capacity, with crystal control to provide the high degree of frequency stability necessary. In the transmitter circuit a single tube phase modulator is used which operates at crystal frequency. This phase modulator is in turn followed by frequency multipliers that multiply the crystal frequency 36 times to produce the desired carrier frequency. A frequency of 158.175 megacycles was used on all of these Northern Pacific tests because the nature of the tests was such that multiple frequency operation was neither desired nor necessary.

FM Receiver Units

All receivers were crystal controlled, triple detection super-heterodyne FM units. These receivers had high sensitivity, good selectivity, and a very effective squelch circuit.

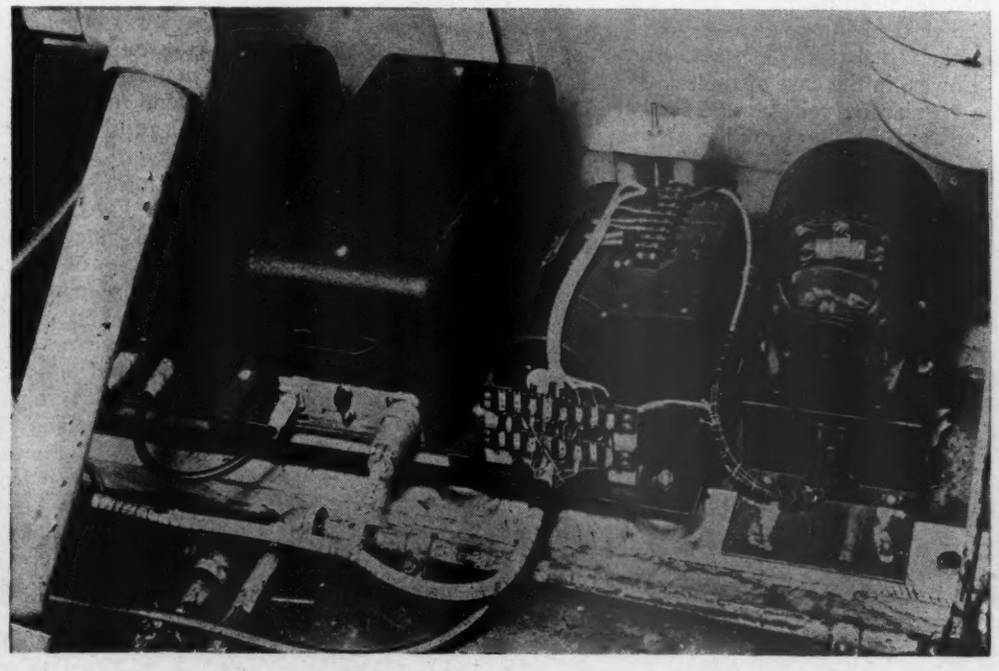
Frequency modulation was used because of its better signal to noise ratio, as compared to amplitude modulation.



Radio transmitter, receiver and power supply unit in the Diesel enginehouse at Auburn, Wash.

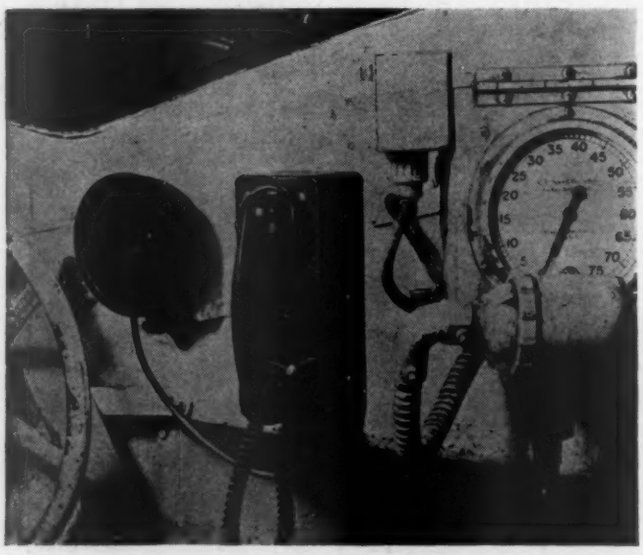
In mountainous regions or under other circumstances where a multiple-path signal is received on a mobile unit, a severe "flutter" is often observed when using amplitude modulation. However, when FM is used, as long as the radio signal is sufficient to give reasonable limiting in the receivers, the audio output of the receiver is clean and free of flutter.

Regular permanent magnet loud-speakers, used in the Diesel locomotives, were mounted just above and to the right of the brake wheel on the fireman's side of the cab. In the steam locomotive, however, a high-efficiency voice-range speaker was mounted at an angle high up on the fireman's side of the locomotive cab with high-frequency directivity in the direction of the engineman. All speakers were cut out by the push-to-talk button in order to prevent



Mobile apparatus as mounted under a seat on the car used for the tests

accoustic feed-back, as both transmitters and receivers were on the same frequency. The microphones or transmitters were regular Western Electric hand-sets, which, besides serving as a most satisfactory microphone, provide sidetone. Sidetone is the feedback through local connections from microphone (transmitter) to receiver in the



Handset and loudspeaker mounted in the locomotive

same station. This enables one to monitor his own speech and guards against over modulation and distortion by excessively loud speech input.

Quarter-Wave Vertical Antennae

For both the mobile and wayside tests, quarter-wave vertical antennae with ground plane were used. On the Diesel locomotives, the cab roof constituted the ground plane. On the business car a metal plate installed beneath the antenna served as a ground plane, while a similar arrangement was erected on the roof of the enginehouse about 42 ft. off the ground for the wayside station tests at Auburn. For the steam locomotive installation, the antenna was mounted atop the weatherproof box which housed the radio equipment. The total height of the antenna plus the mounting base was 18 in. The quarter-wave vertical antenna was chosen because of its simplicity, and the fact that it is mechanically rugged.

Power, in the case of the two Diesels, was provided by the regular 64-volt storage battery which proved to be adequate. On the steam locomotive, the headlight generator furnished power for the radio equipment. This was a Pyle-National Type E turbo-generator capable of delivering 1,000 watts at 32 volts d.c. For the wayside station tests, the power unit operated on standard 117-volt 60-cycle power. This unit provided the necessary high voltage as well as filament voltage for the transmitter. The receivers used in the tests had a built-in 117-volt a.c. power supply. For test purposes, the radio apparatus on the rear end of the freight train was installed in a business car equipped with a standard 32-volt d.c. axle-generator and storage battery.

Except for the wayside station, the power consumption was approximately 250 watts for stand by, 150 watts for receiving, and 425 watts for transmitting, all of which are for 32-volt or 64-volt d. c. primary power sources. At the wayside station where operation was from 117-volt a. c. primary power, the consumption was substantially decreased.

For regular use of radio on cabooses, the Northern Pacific is planning to install a gas engine generator that will run continuously when the radio equipment is in service. One standard cupola caboose is now being equipped with an Onan model OTC-2 gas-engine generator, rated at 1,500 watts output, 110 volts, 60 cycles, with a 12-volt storage battery for starting. The gas engine is rated at 3.7 hp. at 1,800 r. p. m. Propane gas will be used for fuel and two tanks, each containing 109 lb. of fuel, will be provided on the caboose. With a load on the generator of 1,000 watts, the gas consumption would be 1.88 lb. per hour. The gas engine generator unit will be mounted at floor level in a specially constructed compartment that is sound and heat insulated, and ventilated by ducts to outside air.

Benefits with Helper Locomotives

Because the run over the Cascade mountains includes long 2.2 per cent grades, it is common practice on the Northern Pacific to cut-in a Diesel helper locomotive about midway in the train. Although this practice has provided a most effective method for handling long freight trains over mountain grades, it has also presented the difficult problem of co-ordinating throttle positions (particularly when the locomotives may be as much as a half-mile apart and around a curve).

During the tests, however, on a freight train approximately a mile long, each of the numerous throttle positions was called by one engineman to the other via radio, and resulted in perfect co-ordination. In one case it was necessary for one locomotive to advise the other quickly to return to a lower throttle position on account of wheel slippage. Thus, it was found that on all occasions the new radio equipment made smoother operation possible with a minimum danger of break-in-two. It was estimated that the more efficient operation resulting from the use of the radio equipment produced a minimum saving of between 5 and 10 per cent in over-all time on a run of 145 miles with ample opportunity in unusual cases to exceed this figure. When the equipment was transferred to the steam locomotive for the second set of runs, it was found that although the ambient noise was considerably higher than that for the Diesel-electrics, understandable communication was maintained.

For the train-to-wayside station tests, as previously mentioned, the equipment was installed in the Diesel-electric engine house at Auburn which is located at the foot of the westward slope of the Cascade mountains. Solid, clear transmission up to 12 miles was maintained with the station from the train even up the mountain grade, and beyond that good communications were interspersed with dead spots up to approximately 24 miles from Auburn.

To provide a means for analyzing the ways in which the new Western Electric VHF radio equipment saved time on a normal, uneventful trip, outlined below are excerpts from an informal log kept by F. L. Steinbright during the run from Auburn to Yakima.

At 9:18 a. m.—Pulled out of Auburn.

9:28 a. m.—Conductor to front end (over radio)—"Hang on to 6 instead of 3 at Kanaskat." (This meant that the engine should remain coupled to 6 cars when making a pick-up at Kanaskat and thus save time in switching operations later on when the six cars were all to be "set out" or dropped from the train at one place.)

9:51—Reception from Auburn (from the fixed radio installation at the Auburn Diesel-electric enginehouse):—Reliable and solid communication for 10 miles.

9:57—Radio reports:—Head end going in hole at Covington.

(*Continued on page 489*)

From D. C. to A. C. With Profit

Lackawanna changes the power supply in its Buffalo terminal from d.c. to a.c. making improvements which will pay for themselves in five years time

Power supply in the Delaware, Lackawanna & Western's Buffalo terminal area has been changed from a 220/110-volt d.c., 3-wire system to a 208/120-volt, 3-phase, 4-wire, 60-cycle a.c. system, with a considerable improvement in operating conditions and a reduction of power costs sufficient to amortize the added investment in a short time.

Much of the power in the city of Buffalo has, for a long time, been generated at 25 cycles, with a considerable portion of the city supplied with d.c. The d.c. power was supplied to avoid the undesirable qualities of 25-cycle current for lighting purposes. The Lackawanna terminal was included in the d.c. area. The Buffalo-Niagara Electric Corporation has gradually changed the 25-cycle a.c. and d.c. over to 60-cycle a.c. power, making suitable arrangements with the customers for keeping existing apparatus in service or replacing it. Such an arrangement was made with the Lackawanna.

Since it would have been necessary for the power company to furnish a motor-generator set to continue to supply the railroad with d.c., the power company agreed to advance the price of such a set to the railroad, if the railroad would change over to a.c. The cost of the set represented about one-third the cost of the change-over, and the reduction in power costs, represented by the difference between a.c. and d.c. rates, allowed for amortizing the investment in less than five years. The change also considerably improved voltage conditions and allowed for many improvements, made possible by the use of a.c.

To accomplish the change, the railroad first installed a transformer station in the basement of the station building. This serves to transform the incoming 4,800-volt, 3-phase, 4-wire power to 208/120-volt, 3-phase, 4-wire power for distribution through the terminal area, a part of which is shown in Fig. 1.

The transformer station (Fig. 2) includes a cubicle containing disconnecting switches, an oil circuit breaker, metering transformers and meters, three 50-kva. Pyranol transformers, a main secondary air circuit breaker, and two branch air circuit breakers, supplying power and lighting circuits, respectively. The station building is supplied directly from the main circuit breaker, the power being carried to the main load distribution center (Fig. 3) by four 75,000 c.m. cables in rigid metal conduit. The platform which supports the load center and the railing is actually a large junction box in which connections are made between load center switches and other circuits. The load center is made up of six sections consisting of twenty-five 3-pole breakers with a common neutral bus. Breaker ratings range from 50 to 225 amp. They supply a number of lighting panels throughout the building, motors for hydraulic elevator pumps, air compressors for the interlocking system, ventilating fans and standby power for air conditioned cars. Battery charging is done with portable rectifiers from the standby power. This was formerly accomplished from the 110-volt d.c. power using resistors to control the current.

Fig. 1—A portion of the station area showing the elevated approach tracks, the train sheds and the station

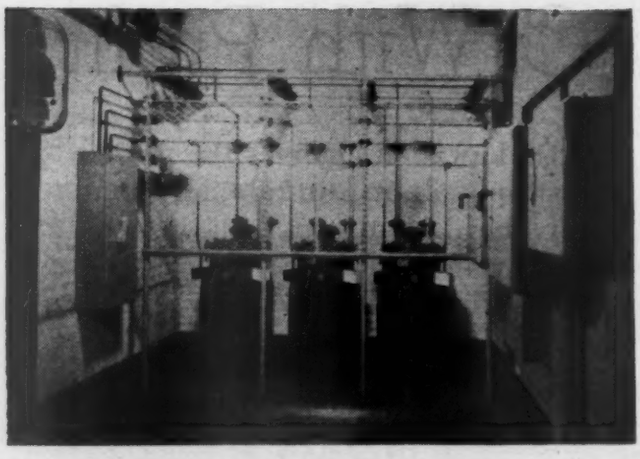


Fig. 2—The transformer station—The meter is on the oil switch cubicle and the air circuit breakers on the wall at the right

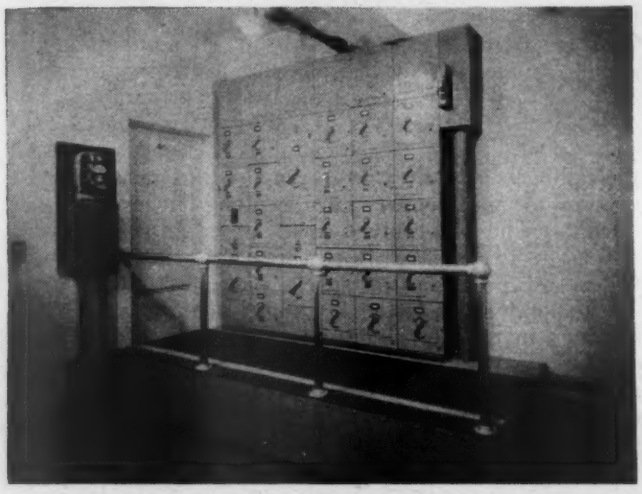


Fig. 3—The load center which is located on the floor directly above the transformer station

Compressed air for the interlocking system was formerly supplied by slow speed compressors driven by large d.c. motors. These were located in the heating plant about 2,000 ft. from the load center. The present compressors are located in the station to eliminate the long power feeder. These are shown in Fig. 5.

The two branch circuit breakers in the transformer station, shown at the right in Fig. 2, serve underground cables—one for power and the other for light. They supply the warehouse, post office facilities, the railway express section of the station, a 40-ton car loading crane, and the lighting in the freight house. The distance from

Fig. 4—The old d.c. switchboard which was replaced by the load center

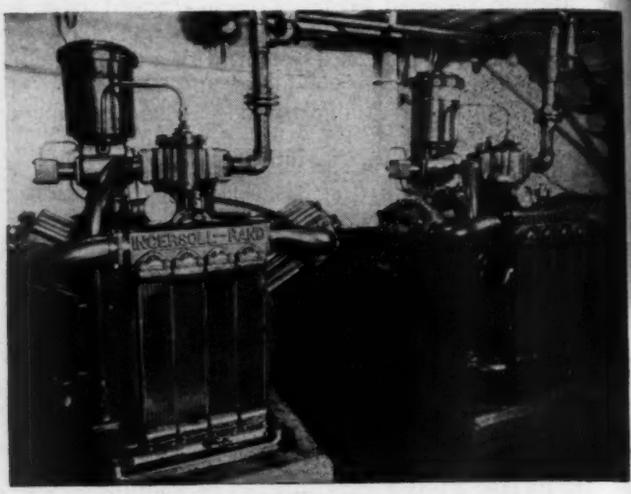


Fig. 5—The new high speed compressors are placed in a space under the stairway adjacent to the transformer station

the transformer station to the crane is 1,800 ft. The crane requires d.c. for its operation, and a small motor-generator set was installed at the crane to supply the necessary d.c. The distance to the freight house is 2,500 ft.

In all cases, it was necessary to change from a three to a 4-wire circuit. This was accomplished in some cases

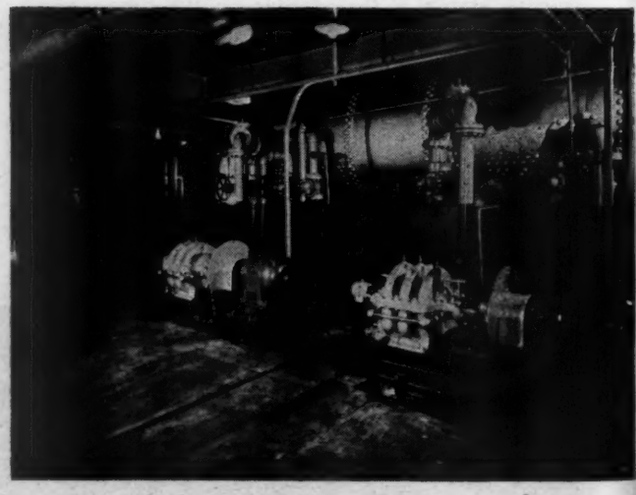


Fig. 6—Hydraulic elevator pumps—These are located in a room next to the load center

by pulling out the cable and replacing it with new, and in others by adding the fourth wire without removing the cable. In some cases, it was necessary to replace damaged underground duct. The two branch lighting and power circuits parallel each other, and are carried into each distribution center where a double-throw switch permits putting the lights on the power circuit in case of a lighting circuit failure.

The entire installation required about 3,000 ft. of various size conductors ranging fom No. 2 to 250,000 c.m. lead-covered, single conductor cable. All joints were made with solderless connectors and rubber mole insulation. All of the change-over was accomplished with no interruption to any single circuit longer than 15 minutes.

Fig. 7—The distribution center in the Post Office

Considering the size of the installation, the amount of new cable used is surprisingly small. This was accomplished by ingenious methods of making full use of existing cables. In some instances, as many as four of the old cables were paralleled to make a single conductor for one of the a.c. feeders. Although some of the parallel cables were in different ducts, the arrangement caused no inductance difficulties because the duct is fiber and not steel. The rubber mole joint insulation can be applied in about one-fourth the time required for making a wiped joint and was particularly advantageous for attaching branch leads to conductors consisting of more than one cable.

The old switchboard, which was replaced by the load center, was left standing while the load center was installed against the wall behind it. One circuit at a time was transferred from d.c. to a.c. after the load center was installed.

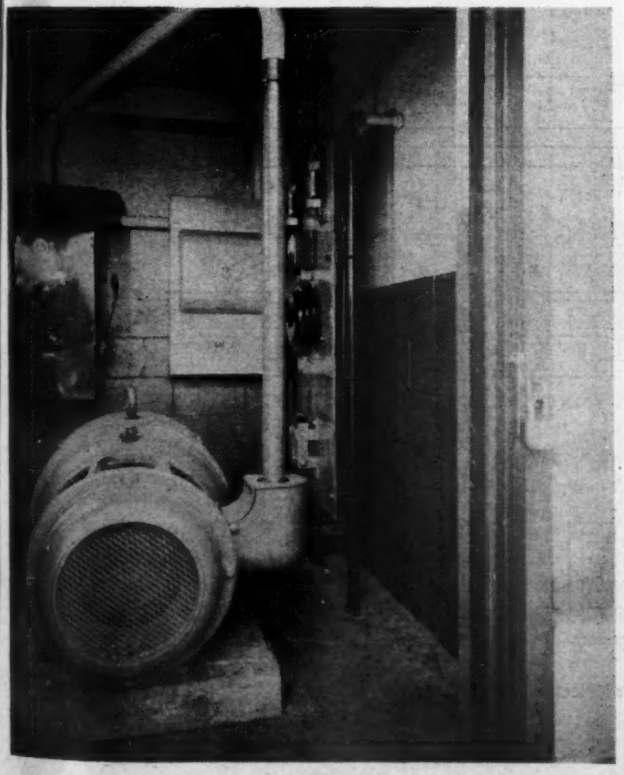


Fig. 8—The motor generator set which supplies power to the crane is located in a small building close to the crane

The long distribution lines were first paralleled by a temporary feeder which carried a.c. power to the load center while the lead-covered cable in the ducts was rearranged or replaced. When a regular cable was installed, the load connections were phased out, and the load connected to both the permanent and temporary cable. The temporary feeder was then disconnected with no interruptions to the circuits. The change-over resulted in replacing old motors with new, and putting all wiring in good condition.

Northern Pacific Tests Radio on Freight Trains

(*Continued from page 486*)

10:09—Rear end reported clear of crossing.

10:20—Rear end reported brakeman on. "Give her the high-ball."

10:43—Conductor told the engineman over the radio that brakeman was going to look train over at Kanaskat. (This meant go slowly so brakeman could get on as rear end came by.)

10:48—Head end radios Auburn that there is a leak in hose connection in "B" unit of the head Diesel.

10:58—Assistant Master Mechanic Hermanson talked to Nelson at Auburn (20 miles) by radio and tells him about leak in "B" unit of Diesel 6001.

12:06 p. m.—Front end contacted helper 6006 by radio, while eight miles apart. (This is in the vicinity of Lester and probably the worst terrain for radio of any encountered.)

12:38 p. m.—Head end reported by radio going to make a set out. While stopped, the train was cut and helper was instructed by radio to come to this location instead of whole train being pulled up to where helper is usually cut in.

12:41 p. m.—Head end radios helper to report when train is in clear.

12:42 p. m.—Helper radios in clear.

1:00 p. m.—Engines 6001 and 6006 checked air, etc., preparing to go.

1:03 p. m.—Engine and helper used radio communications to synchronize starting by going to successive throttle positions at the proper time.

1:31 p. m.—Conductor radios road engine that he had 55 cars in front of helper and if he would pull up close to the switch they would just fit in. (Just leave room for the helper to be cut out.)

2:24 p. m.—Helper radios:—"Uncoupled."

2:26 p. m.—Helper radios:—"Head-end in clear."

2:30 p. m.—Helper indicates by radio: Clear of train and radios back-up signal for front end.

3:23 p. m.—Moving.

3:32 p. m.—Rear end radios all on.

3:47 p. m.—Started into the hole at Nelson for No. 5.

3:56 p. m.—Rear end radios in the clear. Tight fit with 100 cars.

3:59 p. m.—Head end radios high-ball the switch. (Work train took care of it.)

7:30 p. m.—Arrived Yakima, Wash.

Besides the saving in time, this log reveals that more satisfactory operations were assured in pulling into sidings to let other trains pass, ascertaining whether the rear end of the train was completely on the siding, picking up additional cars, picking up trainmen, preparing for cut-in of helper engines, switching operations, and train-to-yard contacts.

Automatic Drying of Electrical Apparatus

Many pieces of electrical equipment which are operated infrequently are so located that they may acquire sufficient moisture to seriously reduce the quality of the insulation. Is it possible in such cases to arrange for periodic and perhaps automatic drying of such equipment?

Drying Can Be Made Automatic

A program of well-managed preventive maintenance is not complete without considering the possibility of moisture absorption of the electrical equipment. This absorption may be caused by direct dripping, splashing, or the presence of high humidity in the air.

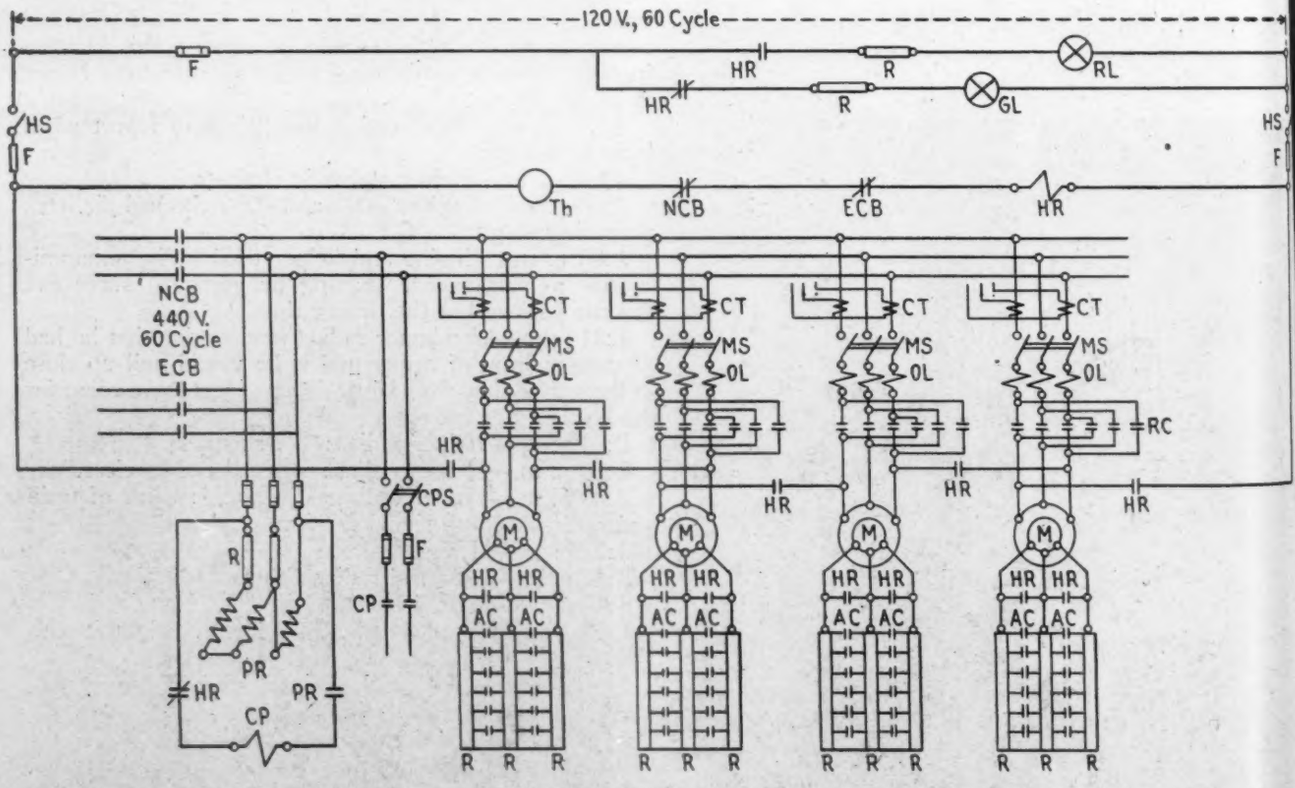
Effect of Moisture.—The extent of moisture absorption and its consequent effect on insulation depend on the type and thickness of the latter. While most insulation will be unfavorably affected by the absorption of moisture or extreme changes in temperature, not all windings exposed to these conditions will necessarily deteriorate and eventually break down. If the humidity is not excessive and the temperature not too high, the insulation may return to its normal state when these conditions have subsided. However, if deterioration of the insulating qualities has begun as a result of such exposure, the decay will be cumulatively progressive.

Insulation Tests.—Depending on the severity of local conditions, periodic tests of insulation resistance by means of a Megger will conveniently give a dependable picture of prevailing conditions. In interpreting the results of the readings, the trend in the change of insulation resistance taken at periodic intervals rather than the actual

Can you answer the following question? Answers should be addressed: Electrical Editor, Railway Mechanical Engineer, 30 Church Street, New York 7.

We have a number of 200-watt lamps mounted on wall brackets and certain 60-watt lamps in pendant fixtures in our shop that seem to burn out oftener than lamps in other parts of the building. What may be the possible cause?

We recently received a ½ hp., 120-volt, 60-cycle single-phase motor of the capacitor type. The capacitor is burnt out and there is no name plate on the motor or capacitor. What is the purpose of the capacitor and what determines its size?



Wiring diagram for automatically drying out electric motors exposed to moisture

NCB—Normal circuit-breaker and contacts
ECB—Emergency circuit-breaker and contacts
CP—Control power relay and contacts
PR—Phase relay and contacts
HR—Heating relay and contacts (14 normally open and 2 normally closed)
HS—Heating switch, double-pole
CT—Current transformers
MS—Motor switch, three-pole
OL—Overload relay
RC—Reversing contactors
AC—Accelerating contactors
M—Three-phase, wound rotor induction motor
GL—Green indicating lamp
RL—Red indicating lamp
Th—Thermoguard
R—Resistors
F—Fuse
CPS—Control power switch

value of the insulation resistance is to be considered. In analyzing these readings, proper consideration should also be given to weather conditions, whether the machine is hot or cold, and cleanliness of the parts, inasmuch as these factors influence the readings which are intended to establish the actual state of the insulation.

In the case of machines exposed to dampness and extreme variations of temperature, machines operating at infrequent intervals and for short durations, it is advisable to take periodic readings at comparatively closer intervals. If a decline in insulation resistance is observed, a practical method of drying out must be adopted.

Driving Out Moisture.—The most practical and economical method, in most cases, is the heating of a machine by means of the copper of its own windings. This method allows the heat and with it the moisture to pass out of the insulation and it is particularly valuable in drying out high voltage machines in which the insulation is comparatively thick.

Space heaters with warm air circulating arrangements may be used but require a higher investment and are not as efficient.

During the drying out process, a constant temperature of 75 deg. C. is desirable. In any case, the temperature of the windings should not be allowed to exceed the observable temperature for which the machine was designed. As heat is applied and temperature held at a constant value, the insulation resistance first decreases due to the negative temperature coefficient of resistance of the insulating materials, and then gradually increases as drying out continues. In order to determine the extent of dryness reached, Megger readings are taken from time to time while the heating current is on.

Care in Drying Out.—The importance of discontinuing the application of heat after the insulation resistance has reached a constant maximum value cannot be overemphasized. Prolonged heating or too high a temperature accelerates oxidation, may start incipient scorching, deteriorates the winding and may result in shortening the life of the winding. A thermoguard mounted on the windings will act as a protection against overheating. This device consists of a thermostat which operates above a certain safe temperature and causes two small contacts to open, in turn opening the control circuit of the heating current relay.

Example.—The method described here is being used on a movable bridge having four 40 hp., 440-volt, 60-cycle, three-phase motors for operating the span. As partly shown in the drawing, the motor circuits are provided with overcurrent relays, current transformers for ammeter and wattmeter indication, accelerating contactors, and resistors.

The heating system is fully automatic. When the span is to be opened for a passing vessel, the normal or emergency oil circuit-breaker is closed. One of the two normally closed contacts connected in series and mounted on the oil circuit-breakers de-energize the heating relay automatically. The position of the relay is indicated on the control desk which is located in another room. The indicating lamps are connected ahead of the heating switch HS so as to make the position indication of the heating relay HR independent of HS controlling the heating current and relay. If the relay is de-energized but not tripped due to a mechanical difficulty or residual magnetism, not only does the red indicating light on the control desk show this condition but also control power for operating the motor directional and accelerating contactors cannot be obtained. This protection is given by a normally closed HR contact in the control power relay coil circuit which was originally energized when PR contact was closed by the phase-relay.

If the heating relay trips as expected when de-energized, CP coil is energized, closing the CP contacts in the control power circuit supplying the contactors. Simultaneously, a green indicating lamp on the control desk shows that HR is properly tripped, clearing the system of heating wiring cross connections. At the completion of the lift, tripping of the oil circuit-breaker automatically switches on the heating system. When the machines are tested with a Megger and found that they have been dried out sufficiently, the double-pole switch HS is opened.

In order to eliminate the use of a transformer for obtaining low voltage, the stator windings of the four motors are connected in series across the 120-volt lighting circuit. With a voltage drop of 30 volts across each 440-volt stator and with secondaries open-circuited, the heating current was 2 amps. When the secondaries were short-circuited, causing an induced heating current to flow in them, the ammeter reading in the stator circuit increased to 11.2 amps. If this drying out current does not prove itself sufficient in the future to generate the necessary heat at certain low ambient temperatures, it is planned to connect the stators two and two in series parallel across 120 volts.

Since this automatic drying out system was installed, the insulation of the stator windings gradually improved and the periodic readings are now much more satisfactory.

R. G. CAZANJIAN

Exhauster Saves Car-Day

The Seaboard has materially facilitated spray painting of the interior of passenger cars by using a discarded passenger-car precooler to draw off the paint fumes while the work is being done. The exhauster is a Sturtevant, size 60, silent-vane fan, driven by a 3-phase, 220-volt, 60-cycle, ½-hp. a.c. motor, equipped with an across-the-line

Precooler as used in the Seaboard's Portsmouth car shops to remove the fumes of spray painting

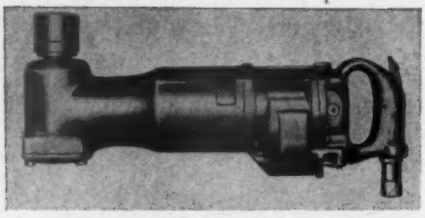
starter. The air connection between the exhauster and one of the car windows is made with a length of 18-in. flexible duct and an adapter plate secured in the window frame by clamps on the inside. One such plate has been made up for each different window size.

The arangement permits doing the ceiling with one color of paint and the side walls with lacquer in one day. Without the exhauster, this operation required two days.

NEW SHOP TOOLS and EQUIPMENT

Impact-Type Angle Wrench

A reversible, impact-type angle wrench for applying or removing nuts up to 1¼-in. bolt size in tight quarters has been developed by the Chicago Pneumatic Tool Company, 6 East Forty-Fourth street, New York 17. Known as the CP 365-Ran angle wrench, it employs a simple rotary pneumatic motor.



This impact wrench weighs 48 lb. and removes nuts up to 1¼-in. bolt size

The wrench is particularly useful for nut running on pedestal bolts, tie-bar bolts, draft-gear rigging, brake-beam release springs and similar applications in railroad shops.

The relative position of the throttle handle and socket spindle can be changed to any of four 90-deg. positions by removing the four bolts which fasten the angle head to the motor. The wrench has a net weight of 48 lb., and is recommended for operation on an air pressure from 90 to 110 lb. per sq. in. Overall dimensions are 21⅞ in. by 6¾ in. The closed handle is furnished with either inside or outside trigger. The fitting for the air hose has ½-in. pipe threads.

Man-Au-Trol Spacer

Pin-point precision in the drilling of holes in metal parts without the use of jigs, and at a saving in time of 20 per cent or better, is now reported possible through a device which has passed exhaustive tests at the Bullard Company, Bridgeport, Conn. The spacer consists of a heavy flat table, which moves either laterally or longitudinally on its base under an accurate drill spindle fixed rigidly in one position. With the work clamped in place, the table is traversed hydraulically from one pre-determined position to another by means of two selector controls, one for lateral positions, and the other for locating longitudinal positions.

The setting of the selector dial by the operator determines which one of a number of cylinders is to receive the hydraulic pressure. A piston in the cylinder reacts to the thrust of the pressure, thereby moving the table. Motion continues until the piston reaches a positive stop. The position of this stop may be varied and selected through a screw adjustment. Once the stops have been set, the work-carrying table will return to them with extreme accuracy.

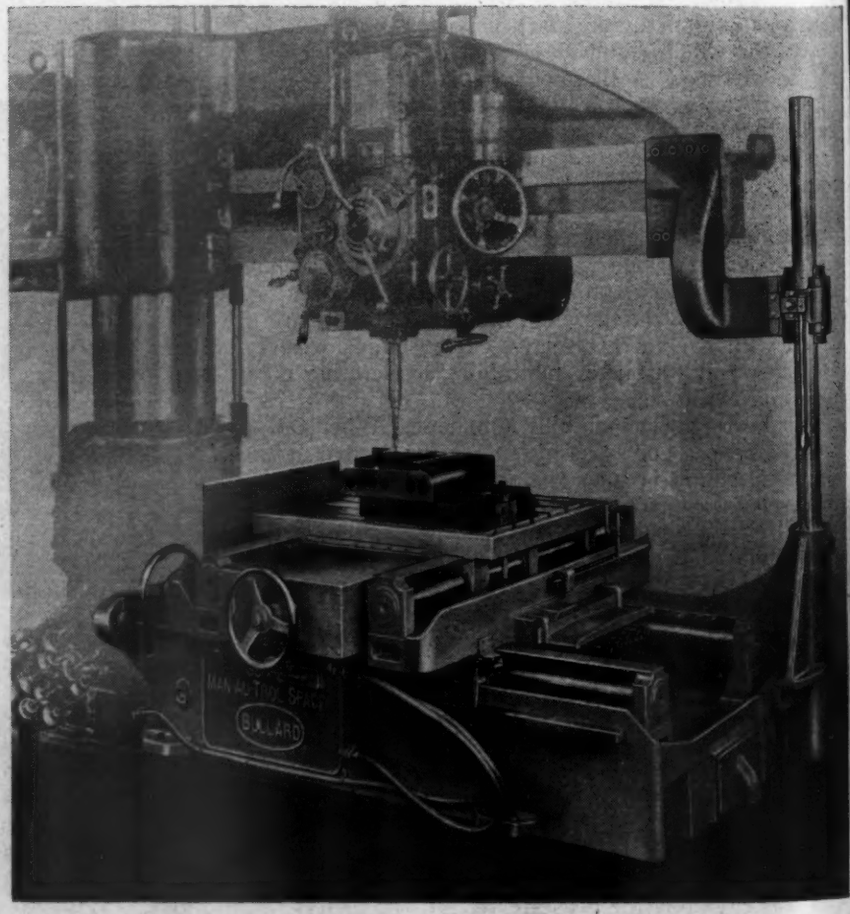
There is one hydraulic cylinder for each longitudinal and transverse motion. Thus, if ten cylinders were provided for each of the two directions there would be 100 positions available. Force from a balanced master cylinder, working in conjunction with the force of any active cylinder, provides a rapid but smooth motion from one location to another and locks the table against its stop. The hydraulic power to operate the spacer is provided by a self-contained pump operated by a constant-speed motor which is the only electrical equipment required.

To demonstrate the Man-Au-Trol Spacer's accuracy, it was set to drill a pattern of four holes in a ⅝-in. thick square of steel. With one piece finished, they drilled the same pattern independently in another piece of steel of the same saze.

One steel plate was placed on top of the other and four steel pins, super-finished to a diameter about .0005 in. less than the holes, were inserted. The holes in both pieces matched perfectly, the pins creating a slight vacuum when they were withdrawn. By removing any three pins and rotati one plate on the remaining pin, every poss ble combination of holes in the plates w tested in the same manner. In each ca the pins demonstrated the sliding fit th proved not only the accurate location o each hole, but that each had been drille in a plane precisely perpendicular to th surface of the steel.

The Man-Au-Trol Spacer makes po sible economies in drilling, reaming, cou ter-boring and tapping operations of part for Bullard machine tools. As example one lot of 74 pieces customarily require more than 70 hours for drilling, using a jig The use of the Man-Au-Trol Spacer save better than 10 hours. The jig, now scrap ped, cost close to $350 to fabricate. An other piece, put through in a lot of 13 would ordinarily have required 20 hours On theMan-Au-Trol Spacer 4 hours were saved and the cost of producing the jig $75, was eliminated. Set-up times were in cluded in calculating the results of all tests.

Bullard engineers attribute these saving to a number of measurable causes. It i difficult, for example, to maneuver the spindle of a radial drill accurately over a



The Man-Au-Trol spacer

ole previously drilled. As a result, the erator customarily changes tools to com- lete all work on a hole while the spindle in place. However, the Man-Au-Trol pacer will move the work to a great num- er of pre-determined positions with pre- ision, and make it possible for the opera- r to use one drill, for instance, until all s work is done before changing to the tap other tool required to finish the opera- on.

Operator fatigue is at a minimum. Since e drilling head is in a fixed position on e rail and the table moves the work ef- rtlessly past the operator while he stands one position, hand cranking for position- g the tool is eliminated. The handling jigs by jib cranes or heavy overhead anes is eliminated.

Inspection likewise becomes simplified. irst-piece inspection is all that is neces- ry. Once a piece has been spotted with e drill and the location of the holes check- by the inspector, the spacer is said to plicate that pattern with such accuracy to insure interchangeability.

The Man-Au-Trol Spacer may be ap- ied to various types of drilling machines, nd, will be made in a variety of sizes, om one with a work-carrying table meas- ring several inches square to others cap- ble of handling massive work.

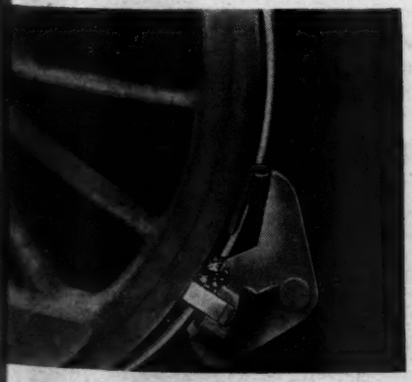
Portable Apparatus For Machining Wheels

To enable railroads to maintain tread con- ours within safe and legal limits without aving to drop the wheels, a wheel ma- hining device has been developed by the Durametallic Corporation, 24 Commerce treet, Newark 2, N. J., which machines team and Diesel locomotive tires, and ender wheels without removing them.

Application is accomplished by removing he brake shoe and head from the brake anger, and substituting the cast-steel cut- ing head for the brake-shoe head. The ool is placed in the cutting-head slot and s held there by friction during the ma- hining operation; there are no setscrews o adjust. The locomotive is moved slow- y, and the special tool, which acts much like a forming tool in a lathe, reduces the flange and forms it to A. A. R. contour. The depth of cut depends on the amount of air reduction made with the engineer's brake valve. The entire job can be performed by a hostler and a mechanic, frequently during a layover.

To obtain the best results, and to lessen the possibility of burning the tool, the locomotive should be moved along a straight siding at a speed not exceeding 3 m.p.h. A whirley, wrecking crane, hoist, or Diesel switcher can be used to pull steam locomotives and Diesel locomotives can either be pulled or provide their own driving power. Both types of locomotives as well as tenders can have all or any of their flanges reconditioned on both sides simultaneously. When only one side is being turned the brakes should be cut out on the opposite side. When only part of the flanges on a side are being machined, friction-reducing strips should be applied to the brake shoes of those wheels not being cut.

Two tools are used to complete the finished job. A square flange-reducing tool cuts the top of the flange off square with the tread. The flange-forming tool is then substituted and used to form the final contour. If it is desired to turn off the rolled-out portion, or lip, of the tread, the operator changes to the square eight-cutting-edge tool and places it so as to rest on the rolled-out portion of the tread. The tool is tilted slightly to cut the outside edge of the tread to the proper bevel, which can be easily done by placing a wedge-shaped piece of iron in the bottom of the slot. The entire operation of returning the flange to the proper contour is accomplished without any reduction in the thickness of the wearing metal of the tread. The tools may be re-ground with conventional shop equipment.



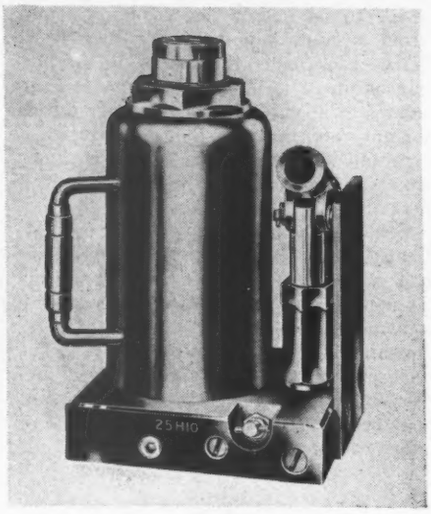
This tool eliminates the necessity of dropping wheels for turning except to remove an out-of-round condition

25-Ton Journal Jack

A hydraulic journal jack for removing and inspecting journal brasses as well as other low-height work in railroad shops and on bridge and structural steel erection jobs has been announced by the Duff-Norton Manufacturing Company, Pittsburgh, Pa. Known as the Hy-Power Hydraulic Journal Jack, this 25-ton capacity railroad jack is one of a series of eight Hy-Power hydraulic models, which includes jacks of 3- to 50-ton capacities.

This jack has dual pumps. The speed pump brings the cap up to load position instantly; the switch-over to the power pump is automatic without changing or missing a lever stroke. All pumps are positioned on bases designed to provide maximum raise with minimum effort. A safety by-pass prevents the ram or lifting arm from being pumped beyond the safe limit of raise. Extension screws have integral serrated caps and are of forged, heat-treated, high-carbon steel. The rams and cylinders are high-carbon seamless-steel tubing, precision machined and ground to insure close fit and smooth operation. The special alloy steel bases have guards to protect pump barrels and to serve as working bases for horizontal applications. Oil lines are completely protected from dirt by filter screens.

Control of the load while lowering is accomplished by a valve operated by a slotted handle. The jack weighs 48 lb. and has a total lift of 6¾ in. The load is carried on a 2¼-in. diameter head and a base 6½-in. by 7⅜-in. Its closed height is 10 in.



The Duff-Norton 25-ton hydraulic journal jack

Railroad Honing Machine

A special railroad-type honing machine is being manufactured by the C. Allen Fulmer Co., 1237 First National Bank Building, Cincinnati, Ohio, that has been engineered to finish all classes and types of cylinders encountered in railroad operation. Among them are Diesel liners up to 16-in. bore, gas engine, air pump or brake, stoker engine, reverse gear, piston valve, and many other types of cylinders. This machine has a maximum working stroke of 48 in. and is powered for fast stock removal. It has a range of flexibility that will permit it to be used for large-diameter long cylinders, as well as the bores of anti-friction bearing boxes, side rods, and similar jobs where extreme accuracy is required.

The honing machine is equipped with a 30 in. by 48 in. sliding ball-bearing table that is air operated with a 36-in. travel out from under the spindle of the machine. This sliding table permits large heavy

The Fulmer honing machine was designed to handle a multitude of internal finishing operations

work to be quickly loaded on the table from a crane, and the table then transferred back under the spindle to the honing position. All operating controls are located at floor level for quick, easy setting for any job. Full push-button operation is arranged so the machine can be operated from the floor level or from a platform, if long cylinders are being honed.

Spindle, shafts, and gears are of heat-treated alloy steel, all mounted on oversize ball and roller bearings running in oil. The spindle has four rotating speeds with a reciprocating speed range up to 90 ft. per min. to assure fast stock removal. The reciprocating mass is counterbalanced hydraulically for smooth, shockless reversals, and there is no over-run of the spindle at either end of the stroke.

Lubricating Oil Maintenance Equipment

For combating contamination of lubricating oil used in Diesel engines, a line of standard equipment has been designed by the Hilliard Corporation, Elmira, N. Y., to reclaim, purify, or re-refine these oils, and bring them back to original new-oil specifications.

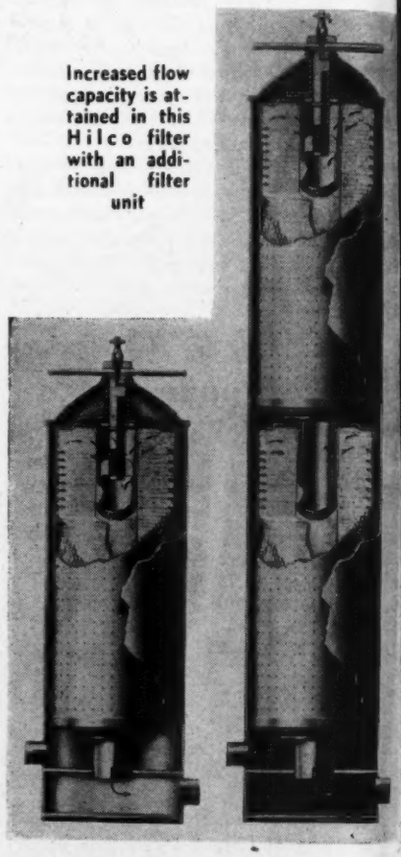
The first of these items is a lubricating-oil purifier which is available in various capacities from 6 to 130 gals. for reclaiming oil. The oil is drawn into the inlet by means of a vacuum, as all processing is done under vacuum to prevent oxidation of the oil during the period of treatment. The oil flows into the heater tank, and fuller's earth or activated clay is introduced to absorb acids and solid matter such as carbon, sludge, and abrasives. During the period of treatment, approximately one hour, the oil is heated to 450 deg. F for evaporating moisture and fuel dilution to restore viscosity, flash point, and fire point. The oil is then permitted to flow to the rundown tank, and the mass forced out of the rundown tank by compressed air into the filter press. This standard plate-and-frame press with filter papers retains the fullers earth or activated clay containing the solids, and the clean oil flows out through a discharge line.

To remove solid matter from lubricating oil as fast as it is formed, a line of Hilco filters for application on the locomotive are available for the purpose of maintaining the entire batch of oil in a satisfactory condition until such time as moisture and fuel dilution have accumulated to the extent that re-refining becomes necessary. These items may be used for either continuous or by-pass filtering. The cartridges are made in two styles, the factory-packed throw-away type, or the bulk repackable style.

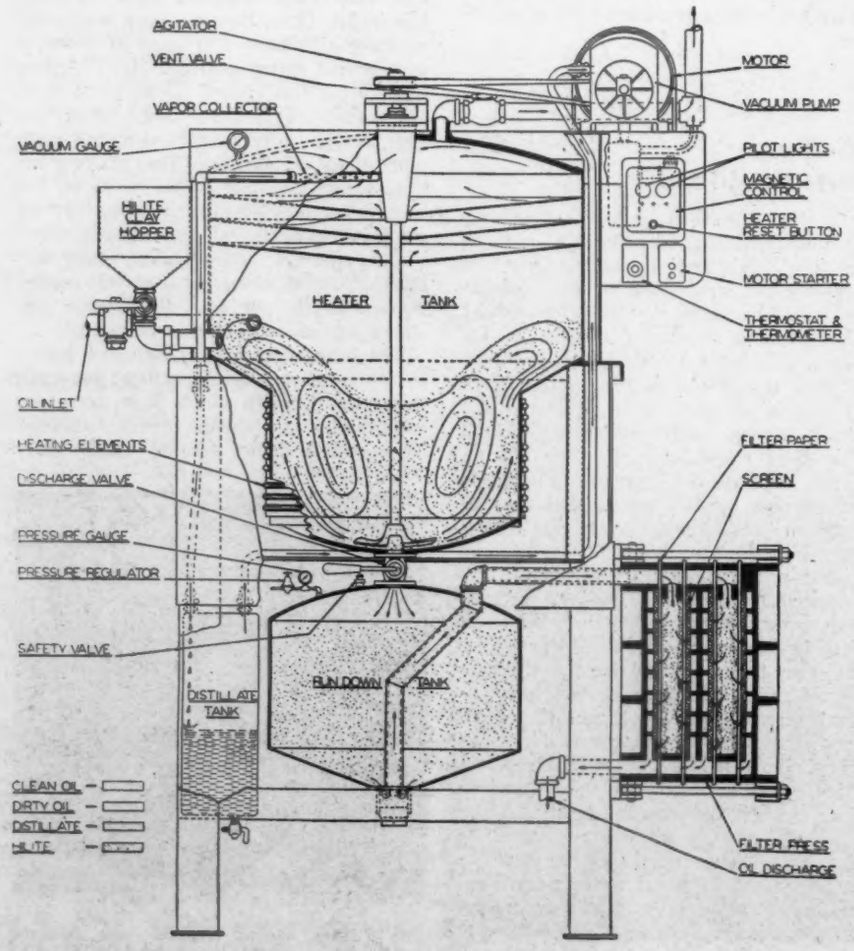
The material of the cartridge can be Hilite or Hiltex. The Hilite is fuller's earth, and is used for straight minerail oils. The Hiltex-cellulose is an all-purpose filtering material for mineral and additive or heavy duty oils. The Hiltex cartridge will entrain about twice as much solid matter as the Hilite, but is less effective in reducing acidity.

In operation, the oil admitted to the cylindrical casing of the filter flows through the perforated metal shield of the cartridge where it comes in contact with the entire outer circumferential area of the filtering material. The oil passes through the filtering medium into the perforated steel center tube, from which it flows out through the discharge opening to the engine.

There are several general types of cylindrical casings. The illustration shows a casing containing a single cartridge. When it is desired to increase the flow of oil to be filtered, another casing may be added. As the interior surfaces of the casings line up with no obstruction, the filtering area, and hence the rate of oil flow, is increased in proportion to the number of casings added. Other designs contain two or more cartridges per casing, mounted side-by-side, top-to-bottom, or a combination of both. mountings where four cartridges are contained in a single casing. Heaters and relief valves are optional in the larger sizes.



Increased flow capacity is attained in this Hilco filter with an additional filter unit



Cross-section of a Hilco oil reclaimer

Hydraulic Duplicating Lathe

The American Hydraulic Duplicating Lathe is a combination of their Pacemaker Lathe and an especially designed built-in Turcha Hydraulic Duplicator. It is available in 16-in. and 20-in. sizes with capacities of handling work up to 4- and 8-in diameters respectively. The function of this lathe is to reproduce accurately and rapidly from a templet, mounted on a holder attached to the rear of the lathe, such work as spin-

lles, motor shafts, valve stems, back shafts, piston rods, or any other shaft having an irregular contour. It will reproduce steps, tapers, right-angle or tapered shoulders, recesses, grinding necks and radii. Metal is cut at the speeds and feeds recommended for cemented carbide tools, and contours are reproduced accurately. The variation of spindle speeds is secured through the standard geared head transmission and the feed variation through the standard quick-change gear mechanism.

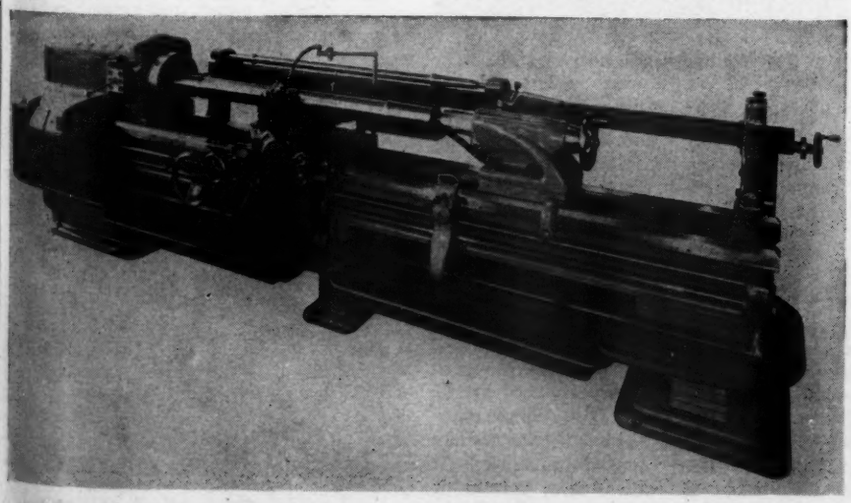
There are no stops to set, no multiple tooling required for operation, and no complicated electrical equipment. This lathe cuts metal continuously as it does not have to be stopped for measuring or calipering. Measuring is confined to the first diameter only, after which all other diameters are secured automatically. The hydraulic equipment consists of a motor driven hydraulic pump which supplies the hydraulic pressure and a hydraulic tracer valve which meters the oil directly to the piston which in turn controls the movement of the tool slide which supports the cutting tool. The pump unit is usually located on the floor at the rear of the lathe, and the fluid under 300-lb. pressure is piped to the small cylinder attached to the tool slide. The tracer valve is mounted on an independent slide, the movement of which is controlled from the front through a screw and nut by the small hand wheel at the right of the tool slide. This positioning of the tracer valve is the means by which the relation between the tracer point and the cutting tool is changed for varying the depth of cuts. A micrometer dial graduated in thousandths and reading directly on the work diameters is located on the adjusting hand wheel for accurately determining the diameters desired.

A sensitive, manually controlled lever is provided for effecting the quick advance and return of the tool slide. At the end of a cut or at the discretion of the operator the tool slide may be retracted by this lever, thus quickly withdrawing the tool from the work. The tool slide is then held in the retracted position by the hydraulic pressure until the operator, by moving the control lever in the opposite direction, advances the slide until the tracer point again contacts the templet or until the slide reaches its forward travel limit.

The templet may be made either from a piece of sheet metal, or, for the smaller material, may be an original of the shaft to be reproduced. When a shaft is employed as a templet, it is mounted between the centers of the adjustable templet supports. When a sheet metal templet is used, it is located on a holder which is attached to the templet support bar which is adjustable lengthwise by means of the hand wheel at its right-hand end. This adjustment is provided to compensate for the variation in center hole depths in the work, but primarily to permit convenient alignment of the templet with the work when setting up the machine.

An important feature of this equipment is the design of the tool slide which carries the cutting tool. This slide operates at a 45-deg. angle to the work axis which compensates for the longitudinal movement of the carriage, thus permitting the reproduction of square shoulders as well as radii and bevels, and eliminating the necessity of stopping the longitudinal feed of the carriage to reproduce square shoulders.

This product of the American Tool Works Company, Pearl street at Eggleston avenue, Cincinnati 2, Ohio, may also be used as a conventional or standard engine lathe by removing the templet, and, by means of the control lever, locating the tool slide in its full forward or "in" position where it is held against the thrust of the cut by the hydraulic pressure in the cylinder.

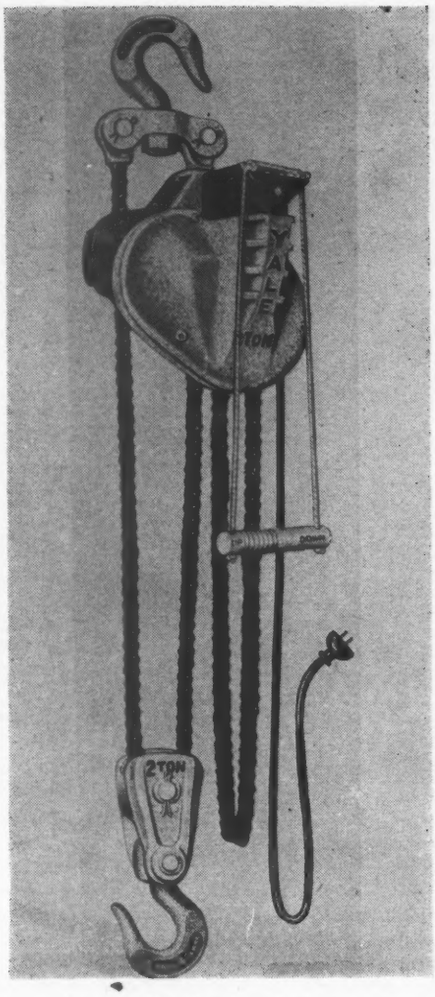


The 20-in. model American hydraulic duplicating lathe machining a 6⅞-in. diameter piston

Electric Hoist

The Yale line of Midget King electric hoists now includes a two-ton model which is light in weight, yet said to be capable of producing fast lifting power. A 1 H.P. motor does the lifting and the lowering. Control is obtained by a flip of the wrist on the one-hand bar grip, thus leaving the hoist operator with his other hand free to guide the load.

To carry the load, a strong, light-weight alloy-steel roller chain is used. The load hook is of special steel which provides maximum safety for both the load and the worker, and is designed to open slowly without fracture before any other part of the hoist is strained to the yield point. Upper and lower limit safety stops prevent overtravel of the hook. The load brake and independently acting motor brake operate whether the power is on or off; both brakes, all wiring, and the controller are totally enclosed.



Yale electric hoist with 2-ton unit

The shaft and all gears are alloy steel, forged and hardened for maximum strength and long life. Precision bearings are used throughout, and oil bath lubrication protects all frictional parts against wear.

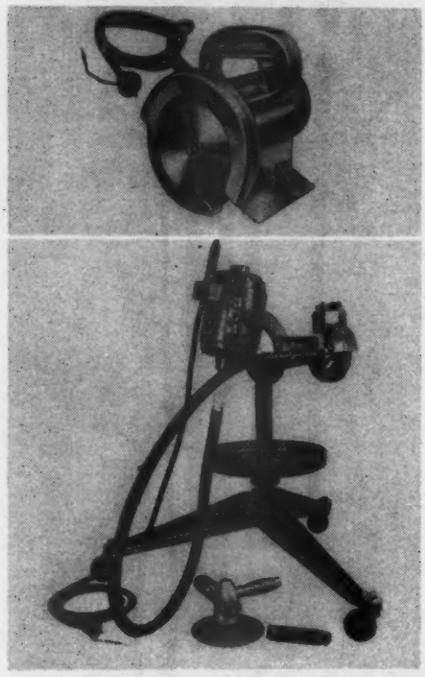
This product of the Yale & Towne Manufacturing Company, 4530 Tacony street, Philadelphia 24, Pa., is available with a hook for stationary use and with a permanently attached trolley for use on an overhead track. Accessories include a chain container for collecting slack chain, eliminating kinking and keeping the chain away from the worker and the load. To provide automatic electric cord support and feed when the Midget King is used on a trolley, a special device is available.

Portable Cutting and Grinding Equipment

Two products for the cutting and grinding of materials have been announced by the Mall Tool Company, 7740 South Chicago avenue, Chicago 19. The first of these is a 6-in. portable electric saw with a cutting capacity up to 2 in. It features an aluminum die-cast housing balanced to make it easy to handle with either hand,

and has a light weight of 9 lb. The saw blade is revolved at 3000 r.p.m. by a ¾-h.p., 115-volt, a.c.-d.c. motor.

A ¾-h.p. motor is also used to drive the flexible-shaft grinder, but this motor operates on 110/220-volt, single-phase a.c. current. The grinder, known as the Mallflex, is equipped with large casters for easy



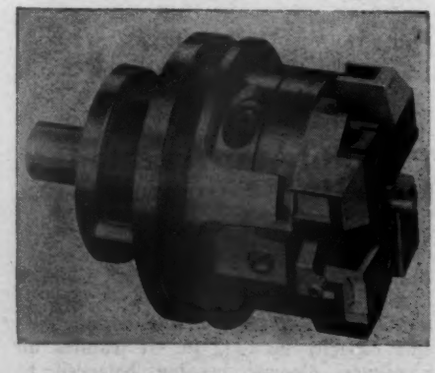
Mall tools for light shop work—Upper: The light-weight saw—Lower: The flexible grinder

portability. The pedestal-type mounting allows tilting and swiveling of the motor, which permits the motor to follow the operator's movements and lessens the wear on the flexible shaft and the housings at the motor end of the shaft. A large selection of spindles and attachments are available to enable the grinder to perform jobs involving grinding, disc sanding, polishing, wire brushing, drilling, drum, etc.

Die Head

A 9/16-in. Lanco taper attachment die head having a capacity of ⅛-in. to ½-in. standard pipe threads has been developed by the Landis Machine Company, Waynesboro, Pa. The die head is of the rotary type and adaptable to any machine having either a leadscrew or lead cam. It can be furnished with a special shank and flange for adapting it to different machines.

Tapered threads are generated with the die head the same as straight threads in that they are formed with the chaser throat. This eliminates chaser "leave-off" marks when the die head opens such as is experienced when using plunge cut or cutting tapered threads with the full width of die. These devices fitted with alternating tooth tangential pipe chasers have proved successful for threading stainless steel. The combination of die head and alternating-tooth chasers prevents tearing on the crest of the thread since the chip is formed only on one side angle of the thread.



The Landis taper attachment die head

Ball-Bearing Turntable

A turntable which has its weight carried on a ring of 1-in. diameter ball bearings and which allows the load to be turned to any position almost without effort is announced by the Whiting Corporation, Harvey, Ill. The turntable is available with three styles of tops: the plain checkered without grooved or raised tracks and no locking device, the grooved-track type with positive automatic locking device for four positions 90 deg. apart, and the raised-track type with the locking device.

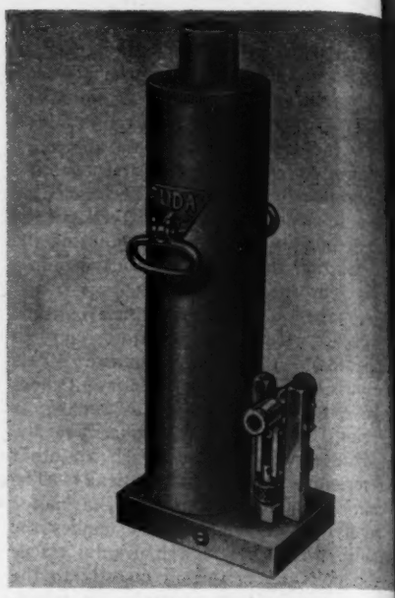
The turntable top is carried on hardened steel balls, running in a specially machined ball race to permit wide distribution of load and easy operation. A quick-acting, foot-operated release lock, at table-top level,

The Whiting ball-bearing turntable

holds the table securely in position. The top overlaps the bottom casting to prevent accumulation of dirt. Standard sizes range from 42-in. to 96-in. diameter; larger tables will be built on order.

Hydraulic Journal Jack

A 50-ton hydraulic journal jack has been added to the line of jacks produced by the Buda Company, Harvey, Ill. These two-speed hydraulic jacks have two distinct speeds, a fast speed for quickly raising light or medium-heavy loads and a normal or standard speed for raising capacity loads.



The Buda 50-ton hydraulic journal jack

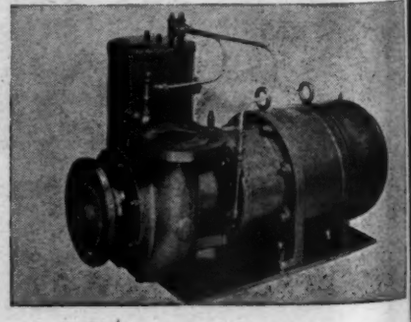
The raising of loads is accomplished by easy pumping action. The lowering of loads is regulated by a simple control valve making the loads under complete control of the operator. The loads may be held indefinitely at any height.

These jacks are available in two models the 50-B-12 and the 50-B-26. Both are designed especially for general high lifting jobs and said to be useful in railroad repair shops, for bridge work, and for extremely heavy general industrial lifting. Model 50-B-12 has a height closed of 12 in., a rise of 7 in. and weight of 120 lb. Model 50-B-26 has a height closed of 20 in., a rise of 20 in. and a weight of 200 lb.

Sealed Pump

To provide a safe method for transferring gasoline, Diesel fuel and other hydro-carbons, a pump has been designed by the Byron Jackson Company, P. O. Box 2017 Terminal Annex, Los Angeles 54, Calif., which is designed to prevent leakage of the pumped liquid or its vapors to the atmosphere. Even though the pump breaks suction, the ground seal faces cannot burn because of the lubrication of the oil in the tank. This oil acts as a seal in the pump and as a lubrication for the seal faces.

The model TLB is a single suction, single stage centrifugal pump with the pump close-coupled to an induction motor with a single



Sealed pump for transferring hydro-carbons

shaft common to both. A double mechanical seal, contained in an oil-filled, liquid-cooled seal chamber, replaces the conventional stuffing box, and a special two-compartment oil tank connects the pump discharge to the seal chamber in such a way that the seal chamber is filled with oil at the discharge pressure but that the oil is isolated from pumped liquid. The original filling of oil will last a year or more. The seal arrangement has several advantages: minimized leakage of costly, inflammable liquids through the seal chamber; good lubrication of ground seal faces is maintained by leakage of lubricating oil from the seal chamber even though the pump loses suction—this leakage said to be so minute that no trace can be found in the pumped liquid—and no corrosion of seal parts regardless of the liquid pumped.

Welding Rod for Staybolt Sleeves

A welding electrode has been developed especially for the welding of staybolt sleeves to eliminate the porosity and rough appearance of the weld which results from performing this work with bare electrodes. Known as the Champion Sleeve Rod, this product of the Champion Rivet Company, Harvard avenue and East One Hundred-Eighth street, Cleveland 5, Ohio, is a heavily coated electrode that operates in all positions on a.c. or d.c. reverse power.

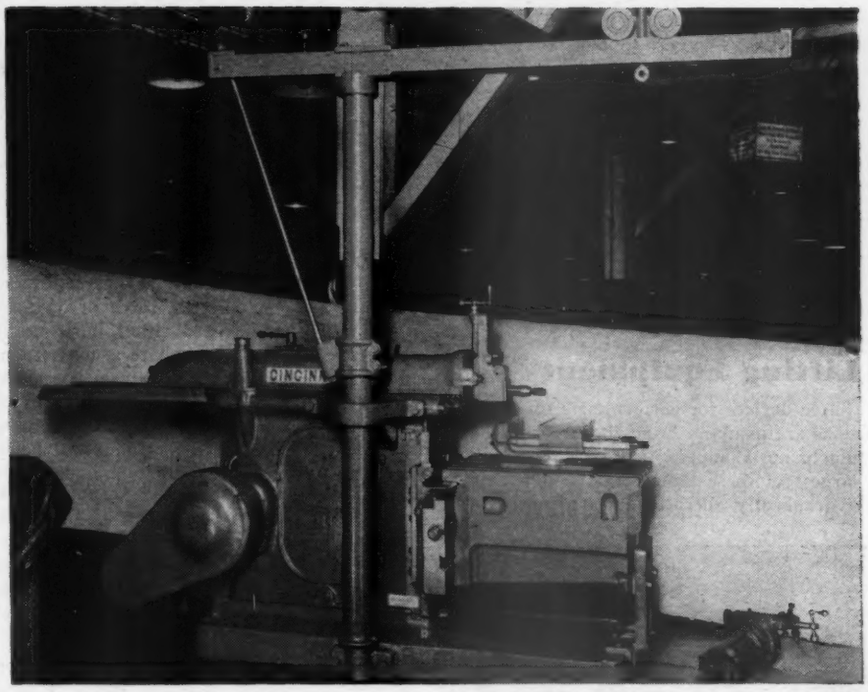
This rod is said to produce sound, clean weld metal free from porosity when used to weld the high-sulphur steel from which is difficult to weld with an ordinary heavily coated electrode.

Railroad Shaper

A shaper that has the capacity for the largest driving boxes, but still convenient for other shaper jobs, such as tool and die work, is available in 32- and 36-in. models from the Cincinnati Shaper Company, Cincinnati 25, Ohio. The features which make these models especially adaptable for railroad work are the special driving-box table, the extended circular feeding head, a shoe and wedge chuck, a main rod brass attachment, and a 1,000-lb. boom crane.

The driving-box table is built with a removable top, 9½ in. deep, which provides an extreme distance of 28¼ in. between the ram and the working surface of the table. This top is left in place when planing the crown-brass fit in the driving boxes, planing shoes and wedges or when doing the usual run of shaper work. It is removed when planing driving box shoe and wedge fits or crosshead bearings. When used in this way, there is sufficient height between the table and the ram to mount the largest driving boxes directly on the table, in line with the outer support, giving the greatest stability for the cut.

The top working surface is 24 in. wide and 34 in. long on the small shaper, and 36 in. long on the 36-in. shaper; the lower surface is 28¼ in. long and 24 in. wide. Both have T-slots, and the upper table has holes conveniently located into which stop pins may be inserted. The outer support



The Cincinnati railroad shaper—The circular feeding head is shown lying at the right

for the table is effective without interference at all heights, whether the removable top is on or off.

The feeding head can be rotated in planing out the crown-brass fit in driving boxes and will plane such fits from a diameter of 8 in. to 18 in. The extended body is bolted directly on the end of the ram and the revolving member has its bearing inside of the solid body. It may be rotated by hand, or automatically, in the same manner as the down feed on the standard shaper, and is interchangeable with the standard head on the end of the ram.

The boom crane has a capacity for carrying loads up to 1,000 lb. and is arranged with a trolley to which any standard chain block can be attached. The vise can be either single- or double-screw type. The jaws are 3 in. by 15 in. and open 15 in. Four bolts are used for both swiveling and securing the vise to the table. The vise wrench fits the tool post, table support and all of the other clamping nuts which the operator uses for making his settings and adjustments.

The shoe and wedge chuck is made in two parts which can be adjusted when on the table to suit the length of the work, enabling the operator to set a surface gauge directly on the shaper table when lining up layout marks. The work rests on four elevating screws for lining up the taper and is held down by eight screws coming in at an angle from the sides. The front half of the chuck is provided with an end stop bar. The fixture is an easy means of simplifying and speeding up the work.

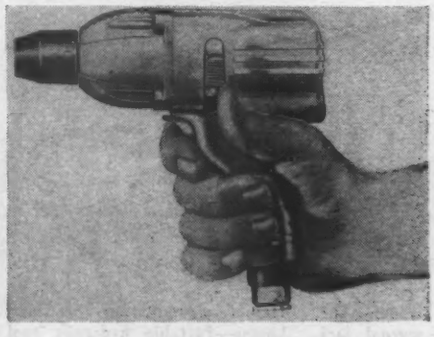
The rod brass fixture enables all four sides of a brass to be finished with one setting of the tool. The brass is held in the fixture by a clamp bolt and a floating washer. Adjustable chuck jaws hold the two halves of the brass against any tendency to open up under clamping or under the cut. The fixture is indexed by moving the hand lever to the left which unclamps and automatically rotates the work. Rotating this lever in the opposite direction reclamps the fixture. The fixture can be arranged to index 90 deg. or any other angle where taper fit is wanted. This fixture will handle brasses up to 11 in. by 15 in.

The actual lengths of the strokes for the large and the small model are 36¾ in. and 32¾ in. respectively. Other dimensions are the same for both models. There are eight speeds of strokes per minute varying from 8 to 102. The cross feeds range from 0.010 in. to 0.170 in. in 11 steps. The horizontal table travel is 30½ in. The distance from the table to the ram is variable from 5¼ in. to 28¼ in. Tools up to 1 in. by 2 in. can be used. Requirements for the motor are 10 to 15 h.p., 1,800 r.p.m. constant speed.

Pneumatic Impact Wrench

The Thor impact wrench is designed for rapid removal or assembly of tight nuts. At present it is available for nuts, bolts, or cap screws up to ⅜-in. thread size. It is a product of the Independent Pneumatic Tool Company, Chicago.

This device weighs 3¾ lb. and is 5⅞ in.

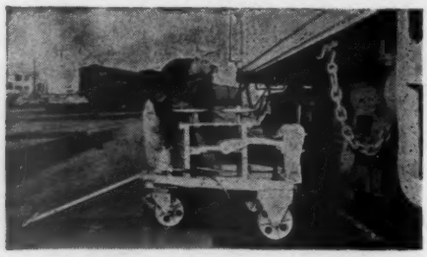


Thor pneumatic impact wrench

in length. Trigger control allows comfortable one-hand operation. Features of the impact mechanism are rotatively striking impact jaws, set at a wide radius from the spindle center to reduce stress, and a short, rigid spindle shank that delivers the blows close to the work. The wrench has a reversible motor, infinitely variable torque control, and automatic lubrication. An optional model with a lever throttle is also available.

Lifting Equipment

Three devices for performing lifting operations are available from the Menasco Manufacturing Company, Burbank, Calif. The largest of these tools consists of a pair of hydraulically operated jaws mounted on a

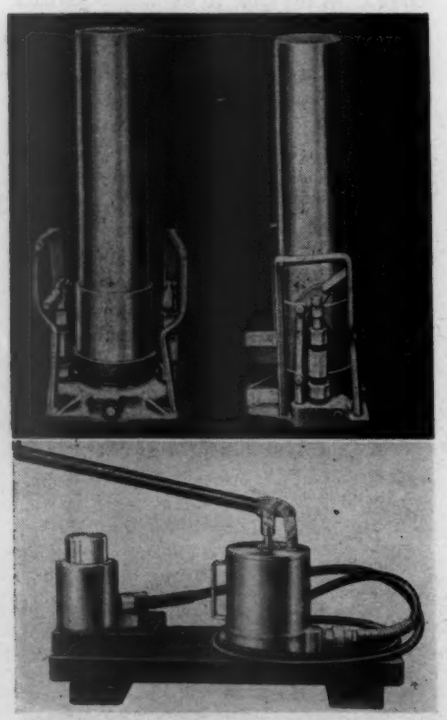


The Malabar elliptic spring remover

three-wheel movable chassis. It is used to compress two-section elliptic springs and to withdraw them from car trucks. The 50-ton hydraulic force necessary for this compression is applied to the jaws by means of the pump located near the front of the chassis.

For servicing journals on loaded freight cars, the Malabar jack enables the operator to inspect and replace the brasses. The car is lifted by spotting the jack under the sill. When the weight of the car is raised off the truck, the toe is swung under the spring bracket and the side frame is raised to permit the necessary work to be done on the journal.

For performing work in cramped quarters Malabar Mobilpower Tool is used. It consists of a pumping unit and a 5-in. high hydraulic ram which has a lift of 1¾ in. and can exert a force of 35 tons. The ram may be used either horizontally or vertically in places where a conventional jack is impractical. The ram is spotted where desired, and a 10-ft. length of high-pressure hose connects it to the pumping unit which is operated in a non-obstructed location. The entire tool is mounted on a hardwood carrying case.



Upper—The Malabar combination car and journal jack. Lower—Portable hydraulic tool for working in cramped quarters

Carbide Lathe File For Hardened Steel

A light weight cemented carbide file for bronze, brass and hardened steels is now available through distributors for the products of Henry Disston & Sons, Inc., Philadelphia, Pa. The filing surface of the tool is a carbide insert supplied by Carboloy Company, Inc., Detroit, Mich. The insert is 4 in. long by ¾ in. wide and is single cut

Light-weight cemented carbide

with 34 teeth per inch on the same angle as standard mill files. At present, the file is being supplied in one shape, size and cut.

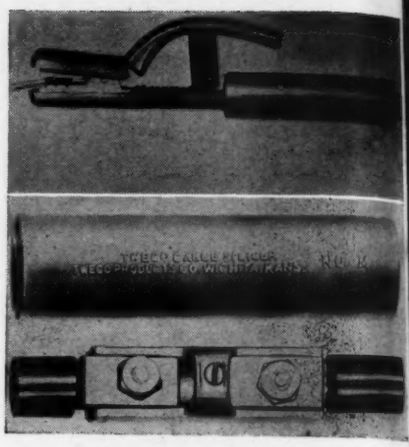
The carbide insert is in one piece, thereby eliminating the objectionable joints in files composed of two or more inserts. When one face of the insert eventually becomes worn, the carbide insert can be turned over and the opposite face used, doubling the life of the tool. The holder is of aluminum, for light weight.

The new tool has been designed primarily for deburring or chamfering hardened steels which must be operated at speeds of 450 feet per minute on lathes. It cannot be used for the hand filing of metal. However, it may be used on molded plastics for hand filing of flat or convex surfaces on which it produces a smooth finish and will not clog. Only very light pressure is required to use the file, the light weight of the tool alone being almost enough to produce excellent results on lathe work.

Welding Equipment

A line of cable splicers and electrode holders for users of arc welding equipment is available from the Tweco Products Co., Wichita 7, Kan. The cable splicer is made of high-copper alloy and has a bolt clamp on each end to secure the cable ends.

To splice cables the only tools required



Equipment for electric welding—Above: Tweco tong electrode holder—Below: Welding cable splicer

are a screw driver to remove the fiber sleeve which covers the cables, and a wrench or pliers to clamp the cables. If desired, solder may be run between the two clamped cable ends to secure maximum efficiency. To cover the full range of welding cables this splicer comes in three sizes.

The electrode holders, known as Tweco-tong, are manufactured in two models. The A series is fully insulated, and the B series semi-insulated. Capacities for either model are 300 amp. and ¼-in. electrode, or 500 amp. and ⅜-in. electrode. Both are tong-type holders and feature molded laminated glass-cloth Bakelite insulation keyed to the holder casting. The tensioning spring seats on fibre upset washers and is protected from spatter by Neoprene tubing. The fibre handle is ventilated to give a cool-running holder.

Electric Car Puller

The Silent Hoist electric capstan car puller has its gearing totally enclosed with the driving motor in a single unit which is said to be dirtproof, waterproof, and suitable for out-of-door use. Within this enclosure the worm-gear reduction runs in a continual bath of oil.

Two sizes of this puller are available. The 7½-hp. unit has a draw bar pull of

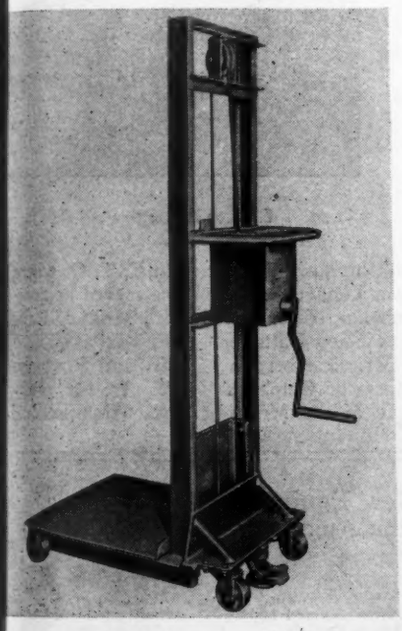
Driving unit for the electric capstan car puller

000 lb., and the 15-hp. unit has a pulling apacity of 10,000 lb. Either size may be d for 220/440-volt, 3-phase, 60-cycle a. c. rvice, as well as for d. c. application. hese car pullers are available from stock the Silent Hoist & Crane Company, 841-7 Sixty-third street, Brooklyn, N. Y.

hop Lifter

compact portable elevator for position-g heavy work, installing machine parts, d for loading and unloading motor trucks available from the Somerville, Mass., lant of Service Caster & Truck Division Domestic Industries, Inc.

The lifting platform is cranked up and own, while a specially designed automatic lutch locks the load in any position. Cut eel gears are used in the hoisting unit for ng life and smooth operation. The lift-



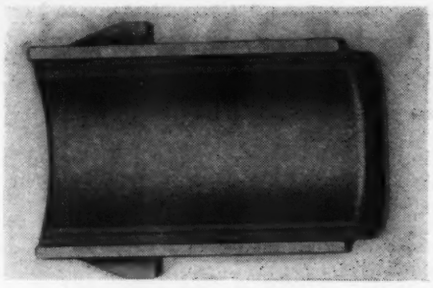
A compact portable elevator for positioning heavy work

ing carriage is equipped with sealed ball bearings, while the guide wheels are of heat-treated steel. The hand crank raises the platform three inches with each revolution, and is removable.

The lifter is easy to move about on its running gear of 4-in. roller-bearing casters. A foot-operated floor lock is standard equipment, and has a moulded-rubber pad on the bottom for floor protection. Specifications include an overall height of 6 ft., a lift of platform of 4 ft. 8 in. from the floor, a lowered height of platform of 5½ in., a platform size 24 in. square and a capacity of 500 lb.

Improved Magnus Products

The type of oil-lubricating device developed by the Magnus Metal Corporation, Chicago, for use on locomotive driving



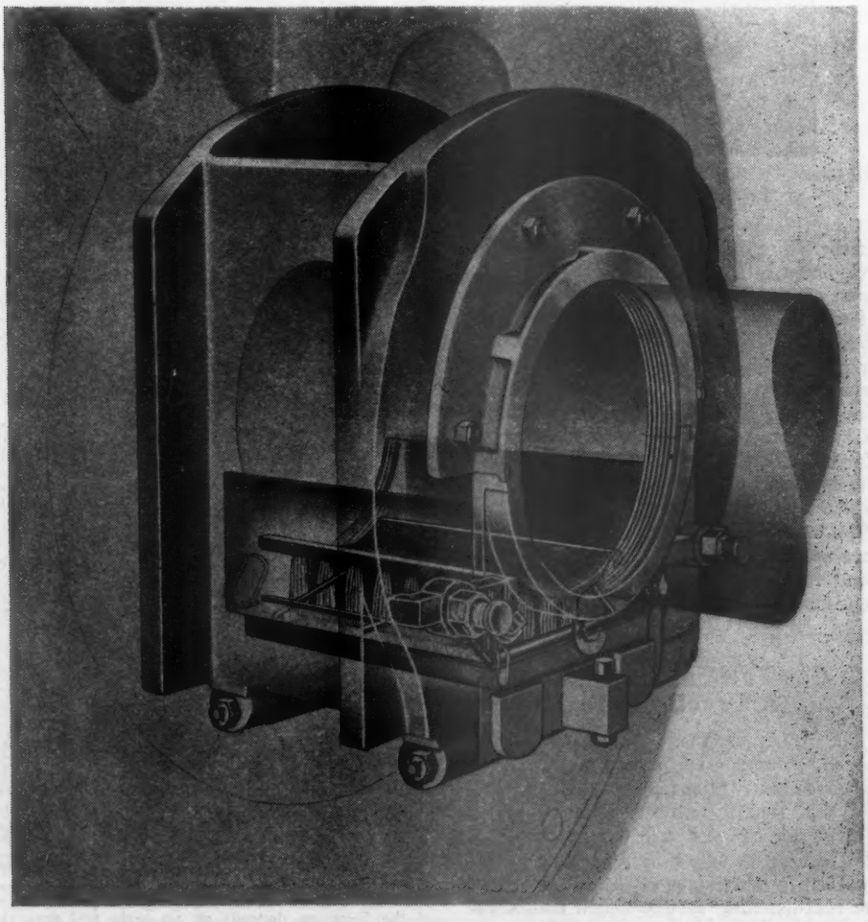
Magnus Stop-Grab journal bearing

journals is designed to increase the life of both journal bearings and lateral faces of boxes as much as three to five times, and greatly lengthen the road mileage between classified repairs. This lubricator has been improved, as shown in one of the illustrations, by a new latching arrangement which gives rigid alignment between the driving box and the oil cellar, and a tight fit which prevents movement between the cellar and the box, thus reducing wear. The latches, formerly at the bottom of box, have been redesigned and placed at the sides, making the lubricator easier to operate and service.

The Magnus journal lubricator pad for locomotive truck, trailer and tender journals, also car journals dispenses entirely with the conventional type of packing. This device is designed to eliminate waste grabs and extensive applications in high speed passenger service are said to have shown superior results as compared with conventional packing previously used. This pad has been improved by sewing the cotton strands which draw the oil up from the cellar to the pad through the top fabric, thus assuring a more plentiful supply of oil to the journal. A still further improvement is the elimination of oil sub cellars formerly used in this assembly which prevents loss of oil by splashing and affords easier removal of the lubricator pad from the box in servicing.

The new Magnus Stop-Grab journal bearing, shown in a second illustration, is made with ledges of brass 7/16 in. high extending along the length of the bearing on both sides of the brass. These ledges are designed to retard waste-grabs and reduce running temperature by providing a ventilated air space between the lower edges of the bearing and the journal.

The Magnus Twinplex hot-box alarm may be applied to a standard A. A. R. or other-type bearing. It consists of two brass tubes each having a small orifice sealed with fusible metal which melts at 325 deg. F. If the bearing reaches this temperature, one of the tubes releases a distinctive and penetrating odor and at the same time the other tube releases a large volume of dense white smoke. The discharge continues until both tubes are empty, which requires about eight minutes, thus giving a positive alarm signal in case of an overheated bearing. The cartridge of the Twinplex hot-box alarm has recently been redesigned to prevent any leakage of chemicals, by the use of a special sealing arrangement using conical-shape brass plugs and a heavier section of metal at the threaded end of the tube.



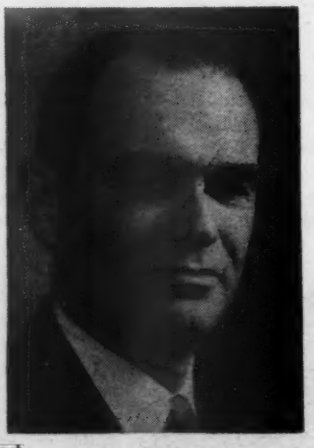
Magnus locomotive journal lubricator with improved latching arrangement

NEWS

Putnam Becomes Consulting Engineer of Car Institute

PALMER COSSLETT PUTNAM has been appointed consulting engineer to the American Railway Car Institute, it has been announced by S. M. Felton, president. Mr. Putnam, who directed the design and development of the famous amphibian known as the DUKW or "Duck," as well as the "Weasel" and many other weapons of World War II, will make, in cooperation with the railroads, a comprehensive exploration covering, among other things, new materials and techniques developed during the war to ascertain possible applications for improving rail freight equipment.

During the war, Mr. Putnam served as an assistant to Dr. Vannevar Bush, director



Bachrach

Palmer Cosslet Putnam

of the Office of Scientific Research and Development. In 1943, on a mission for the joint chiefs of staff to the various theaters of war, his task was that of developing the logistics and tactics of amphibious assault, and for a period he was on loan to, and on mission for, Admiral Louis Mountbatten, Supreme Allied Commander, Southeast Asia Command. Mr. Putnam was born in Canandaigua, N. Y., in 1900. He attended the Massachusetts Institute of Technology, where he received his bachelor's degree in 1923, and a master's degree in 1924. He invented and developed the Smith-Putnam wind turbine, and is a director and chief consultant of Windpower, Inc.

Gas-Turbine Locomotive a Practicability

DR. JOHN I. YELLOTT, director of research, Bituminous Coal Research, Inc., in his first annual report presented at a meeting held recently at the Hotel Biltmore, New York, pointed out the practicability of a locomotive driven by a gas turbine and poweerd by pulverized coal. He described the coal-handling system which makes use of the "coal atomizer" to pulverize coal to the necessary fineness, within the limitations of space and weight imposed by locomotives. He also described the use of small cyclone separators to remove 75 per cent of the fly ash from hot gas streams, which, freed from abrasive materials, may then be used to drive the turbine blades.

"The new gas-turbine-locomotive," Dr. Yellott said, "will use electric drive. It will be able to operate without a tender and will need no water. It will be considerably more efficient in cold weather than in hot weather." He further stated that "the thermal efficiency of the gas-turbine locomotive at the rails is approximately 20 per cent as compared with the efficiency of the present steam reciprocating locomotive of 5 to 6 per cent."

According to Roy B. White, chairman of the Locomotive Development Committee and president of the Baltimore & Ohio, who presided at the meeting, the committee has authorized the purchase of two full-size gas turbines and of special locomotives in which to mount them.

Ringberg Becomes Mechanical Engineer, Transportation Corps

EMIL G. RINGBERG has resigned as mechanical engineer of the Boston & Maine and Maine Central to accept the position as mechanical engineer, Army Service Forces, Transportation Corps, Rail Section, of the United States Army. His headquarters are at the New York Port of Embarkation, Brooklyn, N. Y. Mr. Ringberg returned to the Boston & Maine

E. G. Ringberg

in March of this year from E. T. O. where as a Lieutenant Colonel he served as commanding officer of the 764th Military Railway Shop Battalion.

Mr. Ringberg was born at Roxbury, Mass., on October 26, 1895. He is a graduate of the Mechanic Arts High School,

Orders and Inquiries for New Equipment Placed Since the Closing of the August Issue

FREIGHT-CAR ORDERS

Road	No. of cars	Type of car	Builder
Central of Georgia	200	50-Ton pulp-wood	Pullman-Std.
Chicago & North Western	140	70-ton covered hopper	Bethlehem Steel
Delaware & Hudson	400	50-ton gondola	Bethlehem Steel
Louisville & Nashville	1,250	50-ton hopper	Pullman-Std.
	750	50-ton hopper	American Car & Fdry.
	1,000	50-ton box	Pressed Steel
Union Pacific	1,000[1]	Box	Pullman-Std.
	500[2]	50-ton box	Pullman-Std.
	500[3]	50-ton box	General American
	500[4]	50-ton automobile	American Car & Fdry.
Western Maryland	200[5]	50-ton box	Bethlehem Steel

FREIGHT-CAR INQUIRIES

Atchison, Topeka & Santa Fe	1,750	50-ton box
Detroit & Toledo Shore Line	50	70-ton covered hopper
Graysonia, Nashville & Ashdown	50	70-ton covered hopper
Great Northern	500	50-ton box

PASSENGER-CAR INQUIRIES

Road	No. of cars	Type of car	Builder
Delaware, Lackawanna & Western	15	Coaches	
	2	Dining	
	2	Tavern-lounge	

[1] To cost approximately $5,000,000.
[2] To cost $2,400,000.
[3] To cost $2,400,000.
[4] To cost $3,100,000. Each car to be equipped with automobile loading device.
[5] To be delivered early in 1947.

NOTE:—The Southern has announced a program of modernization and improvement in its through passenger service which will involve re-equipping four trains (the "Crescent," the "Royal Palm," the "Southerner" and the "Tennesseean") with 147 new, lightweight, streamlined cars at an estimated cost of more than $15,000,000. As these trains are operated in part over the tracks of other lines, including the Atlanta & West Point, the Florida East Coast, the Louisville & Nashville, the New York Central and the Pennsylvania, as well as those of the Southern, the other roads will participate on a mileage basis in the buying of the equipment, of which the Southern's share will be 101 cars costing over $10,000,000. The new equipment will include 59 all-room sleeping cars, 8 room-bar-lounge-observation cars, 4 room-bar-lounge cars, 13 diners, 35 coaches, 4 lounge-cafe-coaches, 6 lounge-bar-coaches, 4 baggage-coaches, 4 baggage-dormitory cars and 10 post office cars. How far and how fast this program can be carried on, according to Ernest E. Norris, president of the Southern depends on an early and favorable I. C. C. decision on the road's petition for a 25 per cent increase in freight rates.

Boston, Mass. (1913), and of the Lowell Institute and the Massachusetts Institute of Technology (M. E., 1919; structural engineering, 1921, and E. E., 1923). He entered railway service in 1916 as a draftsman in the employ of the Boston & Albany. During World War I he served with the 4th Engineers (light railways), A. E. F., France. He returned to the B. & A. upon his release from the Army. In 1919 he was appointed assistant mechanical engineer of the B. & A.; in 1924, assistant mechanical engineer of the Maine Central, and in 1933, mechanical engineer both of the Maine Central and the Boston & Maine. He was superintendent of Concord, N. H., shops of the B. & M. from 1938 until 1943. Mr. Ringberg is a past president of the New England Railroad Club.

A. S. M. Awards

THE American Society for Metals has announced that Dr. Edgar C. Bain has been awarded the Albert Sauveur Achievement Award for 1946. Dr. Bain is vice-president in charge of metallurgy and research of the Carnegie-Illinois Steel Corporation, Pittsburgh, Pa., and the award was made on the basis of his conception of a new approach to the heat treatment of steel, which was begun approximately 15 years ago.

Dr. Rufus E. Zimmerman has been elected to receive the medal of the American Society for Metals for the advancement of research for 1946. Dr. Zimmerman is vice-president in charge of research and technology of the United States Steel Corporation of Delaware. His offices are in New York and Pittsburgh. Award of the medal, plaque and citation will be made at the annual banquet of the American Society for Metals to be held in Atlantic City, N. J., on November 21 during the National Metal Congress and Exposition.

First Baldwin Transfer Diesel Locomotive Test

ON July 10, a successful demonstration test run was made with the new Baldwin 2,000-hp. Diesel-electric locomotive recently delivered to the Elgin, Joliet & Eastern for road transfer service on the Outer Belt Line around Chicago. About 100 railway officers and supply company representatives witnessed the test and were accommodated in three Rock Island coaches, coupled in between the rear freight car on the train and two cabooses.

Following an inspection of the locomotive at Gary, Ind., the test was conducted over the line of the E. J. & E. to Joliet, Ill., a distance of 47 miles with 0.33 per cent ruling grade. The consist and weight of the train were as follows: 63 freight cars, 4,284 tons; 3 coaches, 210 tons; 2 cabooses, 36 tons; total train weight exclusive of the locomotive, 4,530 tons. The locomotive handled the train smoothly during this test and without incident except a short delay to set out a freight car which developed a hot box.

In previous non-official tests, this locomotive handled 2,932 tons on a 1.0 per cent ruling grade for the 73 miles between Waukegan, Ill., and Joliet, and loads up to 6,000 tons on a 0.37 per cent ruling grade for the 13 miles between Hartsdale, Ind., and Gary. The fuel consumption in this service is 1.43 gal. of fuel oil per 1,000 gross ton-miles.

Bert M. Jewell Retires

RETIREMENT of Bert M. Jewell as president of the Railway Employees Department of the American Federation of Labor, a post he had held since 1922, has been announced. His successor is Fred N. Aten, vice-president of the Brotherhood of Railway Carmen.

Mr. Jewell was born in 1881 at Brock, Neb., and entered railway service at the age of 19 as a boilermaker's apprentice at the High Springs, Fla., shops of what is now the Atlantic Coast Line. After he finished training he was a "boomer," shifting from job to job and preaching the gospel of union organization in every shop he worked in.

In 1912 he obtained a job with the Seaboard Air Line at Jacksonville, Fla., where he soon became active in brotherhood politics, rising to the office of general chairman on the Seaboard of the boilermakers'

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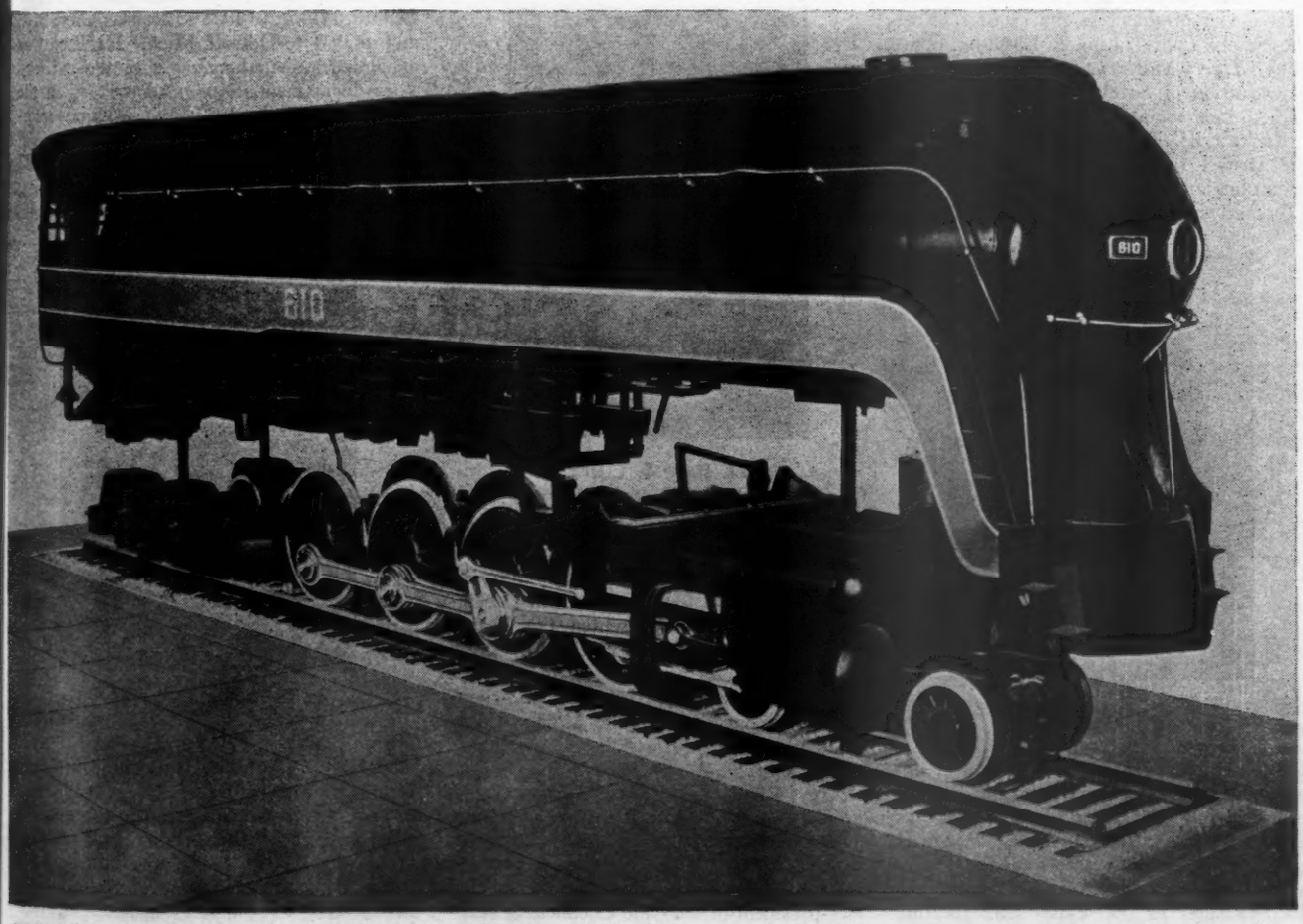


A quarter-size locomotive model which will be shown at the Allied Railway Supply Association exhibit at the Hotel Sherman, Chicago, September 4, 5 and 6, by the Timken Roller Bearing Company—The boiler and cab are raised and lowered periodically to reveal the running gear in operation—The journal boxes are cut away to disclose the roller bearings

union. In 1916 he obtained a "leave of absence" from the Seaboard to join the brotherhood's grand lodge staff as an organizer. During World War I he was assigned to the Washington office to represent that union in negotiations with the government, and in this position he attracted the attention of labor leaders, who in 1918 made him acting president of the A. F. of L. Railway Employees Department.

Ralph Budd Receives A.S.M.E. Honorary Membership

AT a dinner given by the Railroad Division of the American Society of Mechanical Engineers at the Congress Hotel, Chicago, on the evening of August 7, the day prior to the opening of the meetings of the Mechanical and Purchases and Stores Division, Association of American Railroads, Ralph Budd, president of the Chicago, Burlington & Quincy, was presented with honorary membership in the Society. The award was made three years ago, but the exigencies of wartime prevented its presentation earlier.

Following the dinner, Samuel O. Dunn, editor, Railway Age, and chairman, Simmons-Boardman Publishing Corporation, delivered an address on the effect of new economic precepts in interfering with progress.

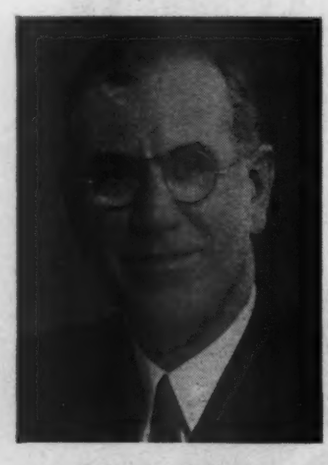
Supply Trade Notes

ALLOYS DEVELOPMENT COMPANY.—*Frederick D. Foote* and associates have purchased the interests of the estate of *Beram D. Saklatwalla* in the Alloys Development Company. These interests include, among others, the Cor-Ten and Aldecor patents. Plans announced by Mr. Foote for the future of his company contemplate an expanded research program and a broadened engineering service to assist the trade in the proper employment of the properties of low-alloy, high-strength, corrosion-resistant steels. Research activities of the company are conducted in the research laboratory of the University of Pittsburgh.

◆

SAFETY CAR HEATING AND LIGHTING COMPANY.—*Charles W. T. Stuart* has been elected vice-president in charge of sales of the Safety Car Heating & Lighting Company. *Harry S. Clarke* has joined the sales organization of Safety. The headquarters of both men are at New York.

Charles W. T. Stuart is a graduate of the Drexel Institute of Technology. He began his business career with the Baldwin Locomotive Works in 1908. In 1909 he



Charles W. T. Stuart

became employed in the motive power department of the Pennsylvania and in 1924 joined Safety Car Heating & Lighting as a sales representative. In 1933, Mr. Stuart was appointed Southeastern district manager for the company and Philadelphia, Pa., manager of the Vapor Car Heating Company, and in September, 1943, became assistant to the president of Safety Car Heating & Lighting. Mr. Stuart is the author of the book "Car Lighting by Electricity", which was originally published in 1921 and 1922 as a series of articles in the Railway Electrical Engineer.

Harry S. Clarke was born in 1921 at Newport, R. I. He is a graduate of Lehigh University, (January, 1943), where he received the degree of Bachelor of Science in Business Administration. In March, 1942, he joined the United States Marine Corps Reserve and after graduation from Lehigh was sent to Parris Island, S. C., for basic training. In April of that year he was sent to Officer Candidate School at Quantico, Va., where he received a commission as second lieutenant in June, 1943.

Lt. Harry S. Clarke

In December, 1943, he went to the Solomon Islands and from there participated in the initial landings on Guam and Iwo Jima. He was promoted to first lieutenant in December, 1944, and was presented the Purple Heart medal for wounds received in action on Guam. He returned to the United States in November, 1945, and was honorably discharged from the Marine Corps in February, 1946.

◆

AIR REDUCTION SALES COMPANY.—*Stephen H. Newburn* has been appointed manager of the Air Reduction Sales Company's Detroit, Mich., district, to succeed G. J. Dekker, who was recently elected vice-president of the Ohio Chemical & Manufacturing Co., an Air Reduction subsidiary. *A. C. Brown, Jr.*, succeeds Mr. Newburn as manager of the Cleveland, Ohio, district.

STANDARD OIL COMPANY (INDIANA).—*G. K. Squier*, formerly assistant manager of railway sales, the Standard Oil Company (Indiana), has been appointed manager of railway sales to succeed *J. Clay Lee*, who has retired after more than 40 years' service with the firm.

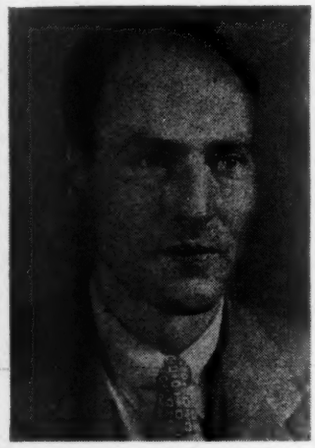
J. Clay Lee left the Chicago, Milwaukee, St. Paul & Pacific in 1906 to join Standard of Indiana as a member of the traffic department in the Chicago general office. In 1919, he joined the Chicago sales division, where he eventually became district superintendent. In 1922 he was transferred to the position of district superintendent at Peoria, Ill. Later in 1922, he became also assistant manager of the Mankato, Minn., sales field. In 1926 he was transferred to Duluth, Minn.; in 1928 to Kansas City, Mo., and in 1931 to Detroit, Mich. Mr. Lee was appointed assistant manager of the railway sales department, with headquarters in the general office, in 1933, and became manager in 1934.

G. K. Squier joined the company in 1923 as a member of the first sales training

G. K. Squier

school at the Whiting, Ind., refinery. He became a lubricating engineer at Detroit in 1924, and was transferred to the general office in 1925. After serving with subsidiaries from 1930 to 1938, he returned to the parent company in charge of the automotive division of the sales technical service department in the general office. In 1943 he became assistant manager of railway sales.

BUDD COMPANY.—*Robert A. Lancaster* has been appointed regional sales manager of the Budd Company, San Francisco, Calif. Mr. Lancaster is a graduate of the engineering school at the University of Virginia. He joined Budd in 1933, when he worked at various jobs in its railroad shops during the building of the "Pioneer Zephyr." He served as service engineer for several of Budd's early stainless steel trains, later becoming contact engineer on the sales staff. During the war he repre-



Robert A. Lancaster

sented the company's war service division on the west coast and became railway district sales manager at the war's termination.

◆

CLARK EQUIPMENT COMPANY.—*William C. Polk* has been appointed national railway representative for the Clark Tructractor division of the Clark Equipment Company, Battle Creek, Mich., with headquarters in Chicago. In his new position, Mr. Polk, who has just been released from three years' service in the Navy, will coordinate all activities applicable to the special material-handling and industrial haulage problems faced by the railroads throughout the nation, with particular emphasis being placed on unification of rail freight transits. Before entering the service, Mr. Polk was sales representative with the Clark Tructractor Battle Creek division. He had previously been engaged in freight traffic work with the Southern Pacific.

◆

GENERAL ELECTRIC COMPANY.—Reorganization and expansion of the General Electric Company's Apparatus Department's Special Products Division, calling for establishment of four separate sections and a marketing and promotion group, has been announced by Warren C. Hutchins, manager of the division. Under the expansion, a Laboratory Products Section will be responsible for pioneering sale of apparatus developed by the company's laboratories. Other sections created are: a Power Rectifier Section, responsible for electronic equipment to deliver direct-current power for electrolytic processes, mines and railways; a Process Instrumentation Section, responsible for sale of equipments for measurement and control of a process; and an Educational Section, responsible for sale of all Apparatus Department products to educational institutions. In addition to the four new sections, a special group has been created for promotional activities of the Special Products Division.

◆

MONARCH MACHINE TOOL COMPANY.—*N. H. Critton,* formerly district manager in Newark, N. J., for the Monarch Machine Tool Company, has been appointed Eastern sales manager with headquarters in New York. Mr. Critton also will supervise an export sales staff now being organized. *F. J. Griffis* of the Eastern sales staff will succeed Mr. Critton as district manager in Newark.

◆

MIDVALE COMPANY.—*Raymond H. Romig* has been appointed district manager in Washington, D. C., for the Midvale Company. He succeeds *Herbert H. Moffitt,* who has retired.

◆

INTERNATIONAL NICKEL COMPANY, INC.—*R. W. Mason, Jr.,* formerly associated with the Lithium Company, Newark, N. J., has joined the development and research division of the International Nickel Company, Inc., with headquarters at the technical section of the division in the General Motors Building, Detroit, Mich.

◆

GRAYBAR ELECTRIC COMPANY.—*N. E. Olsen* has been appointed manager at New Haven, Conn., for the Graybar Electric Company to succeed the late *G. C. Kren-*

N. E. Olsen

ning. J. E. Carroll succeeds Mr. Olsen as manager at Syracuse, N. Y. Mr. Olsen joined the company 24 years ago as assistant office salesman in New York, and became manager at Syracuse in 1930.

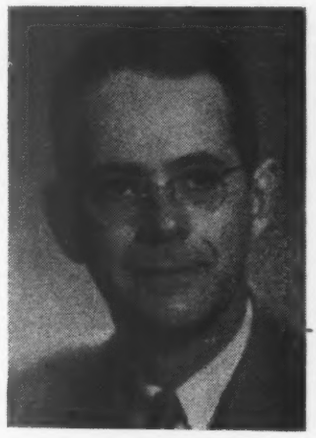
◆

WYANDOTTE CHEMICALS CORPORATION.—Plans have been announced by the Wyandotte Chemicals Corporation for the expenditure of $25,000,000 for additions and enlargements to its present plants within the next eighteen months.

The improvements will include the erection of a new synthetic detergent plant and the erection of new plants to increase production of chlorine, calcium carbonate and soda ash.

Improvements in the present method of producing caustic soda will also be a feature of the expansion program.

WAYNE B. O'NEILL has established a railroad and automotive supply business at 118 New Montgomery street, San Francisco, Calif. Mr. O'Neill was born in 1907 in Salt Lake City, Utah. He began his career during summer vacations from high



Wayne B. O'Neill

school by working in the Denver & Rio Grande Western shops at Denver, Colo. After attending the University of Colorado, Mr. O'Neill, in September, 1928, was appointed sales and service engineer of the railroad and transportation department of the Johns-Manville Sales Corporation, with headquarters in Seattle, Wash. He later was transferred to San Francisco.

◆

UNITED STATES STEEL CORPORATION, CARNEGIE-ILLINOIS STEEL CORPORATION.—*J. Lester Perry,* who rose from a steel plant clerk to the presidency of Carnegie-Illinois Steel Corporation, retired August 1 as head of this U. S. Steel subsidiary to become assistant to the president of United States Steel Corporation. *Charles R. Cox* succeeds Mr. Perry as president of Carnegie-Illinois.

J. Lester Perry, a native of Worcester, Mass., began his business career as a cost clerk in the Worcester operations of American Steel & Wire Company on his graduation from high school in 1899, two years before the United States Steel Corporation was formed. He was transferred to the operating end of the industry as a foreman of the cold rolling department in 1913. From then on he rose rapidly in the Worcester plants of American Steel & Wire through the positions of assistant superintendent and superintendent, becoming manager of the company's Worcester district in 1928. He was appointed vice-president of the company in charge of operations in 1933, with headquarters in Cleveland, Ohio. Two years later Mr. Perry became president of the Tennessee Coal, Iron & Railroad Company, at Birmingham, Ala., another U. S. Steel subsidiary. On January 1, 1938, he became president of Carnegie-Illinois Steel Corporation, with headquarters in Pittsburgh.

Charles R. Cox has been president of National Tube Company, a U. S. Steel subsidiary, since March, 1943. He joined the National Tube Company in 1934 as general superintendent, Ellwood Works. In 1936 he became vice-president in charge of operations; in 1941, executive vice-

president; and 1943, president of National Tube. Mr. Cox was born in Schenectady, N. Y., in 1891 and educated at New York University. He started his business career in 1914 with Marwick, Mitchell-Peet & Co., chartered accountants, New York. From 1918 to 1920 he was affiliated with the United States Shipping Board Emergency Fleet Corporation. In 1920 he came to Pittsburgh with the Crucible Steel Company of America, and from 1930 to 1934 was associated with Babcock & Wilcox Tube Company, Beaver Falls, Pa. Mr. Cox was in personal charge of the ordnance development at the Christy Park works of National Tube in McKeesport, Pa.

◆

UNITED STATES STEEL SUPPLY COMPANY.—*Leslie B. Worthington*, vice-president in charge of sales of the United States Steel Supply Company (a subsidiary of the United States Steel Corporation) at Chicago, has been elected president, with the same headquarters, succeeding *Ernest E. Aldous*, who has retired after 45 years of service with U. S. Steel subsidiaries.

◆

JOHNS-MANVILLE CORPORATION.—*George R. Tierney* has been appointed division sales manager, Pacific division, transportation department, of the Johns-Manville Corporation, with headquarters in San Francisco, Calif. Mr. Tierney entered the service of Johns-Manville in 1919 and was appointed assistant division sales manager in 1939. *John H. Goodwin* succeeds Mr. Tierney as assistant division sales manager at San Francisco.

◆

MINNEAPOLIS - HONEYWELL REGULATOR COMPANY.—*Maurice A. Eastin* has been appointed eastern zone manager of the railway controls division of the Minneapolis-Honeywell Regulator Company.

Maurice R. Eastin is a graduate of the University of Illinois (1935). He joined the New York Central System as special engineering apprentice in 1933, and, in 1940, was appointed electrical inspector of that road, with headquarters at Indianapolis, Ind. Entering the United States Navy in 1942, he served in Newfoundland and in

Maurice R. Eastin

the United States, until placed on inactive duty as a lieutenant commander U.S.N.R., in 1946. Mr. Eastin holds a patent on an electronic temperature control.

HOLUB INDUSTRIES, INC.—Holub Industries, Inc., a new concern recently organized by Bert E. Holub, formerly general manager of Ideal Industries, has begun the manufacture of electrical and mechanical products in its new plant at 413 DeKalb avenue, Sycamore, Ill. *Gordon W. Wetzel*, formerly Mr. Holub's assistant at Ideal, is sales manager of Holub Industries. Mr. Wetzel was recently released from the armed forces after 39 months' service.

◆

ELECTRIC STORAGE BATTERY COMPANY.—*Kenneth W. Green* has been appointed assistant purchasing agent of the Electric Storage Battery Company, Philadelphia, Pa., manufacturer of Exide batteries.

Kenneth W. Green is a graduate electrical engineer of Lehigh University (1924). After graduation he took the students' training course at the Bethlehem Steel Company and worked in its electrical department for three years. He joined the sales staff of the Pittsburgh (Pa.) branch of Electric Storage Battery in 1927, where he served for five years. In 1937 he was

Kenneth W. Green

appointed manager of railway sales. He became manager of the engineering sales division and the railway division, upon their merger early this year.

◆

TRANSPORT PRODUCTS CORPORATION.—The Transport Products Corporation, with headquarters at Louisville, Ky., has been organized to merge the Power Gates Company and the Signal division of the Peerless Manufacturing Company. The engineering and supervisory staffs, as well as all plant personnel of both organizations, have been retained by the Transport Products Corporation.

◆

BETTENDORF COMPANY.—*The Bettendorf Company*, Bettendorf, Iowa, has recently acquired manufacturing and sales rights for the self-contained passenger-car window curtain of R. C. Pratt design. These manufacturing and selling rights also extend to include a new Pratt Venetian blind which is built into a unit extruded-aluminum frame for passenger-car windows.

◆

INDEPENDENT PNEUMATIC TOOL COMPANY.—Independent Pneumatic Tool Company, of Chicago, manufacturer of Thor portable pneumatic and electric tools, [illegible] announced the opening of a new bran[illegible] sales office in St. Paul, Minn., located [illegible] 220 West Seventh street. It is manag[illegible] by *Joseph A. Bell*, for the past six ye[illegible] sales representative of the company in th[illegible] area. The new office will serve all of Mi[illegible] nesota, the eastern portions of North an[illegible] South Dakota, northwest portion of Wi[illegible] consin, and the upper Michigan.

◆

CLEVELAND CRANE & ENGINEERING CO[illegible] PANY.—*Herbert T. Florence* has been ele[illegible] ed president and general manager of th[illegible] Cleveland Crane & Engineering Co., Wic[illegible] liffe, Ohio. Mr. Florence has been gener[illegible] manager of the company since 1938 an[illegible] vice-president since 1941. *A. C. Garne[illegible]* formerly secretary and treasurer, has be[illegible] appointed vice-president and treasurer.

◆

H. K. PORTER COMPANY, AMERICAN-FOR[illegible] PITT SPRING DIVISION.—The H. K. Porte[illegible] Company, Inc., has announced the purcha[illegible] of the business of the American Spri[illegible] Spring & Manufacturing Co., Pittsburgh[illegible] Pa. The new acquisition, together wi[illegible] the present Fort Pitt spring plant, will b[illegible] operated as the American-Fort Pitt spri[illegible] division.

◆

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS.—*Clifford M. Stoner* has been appointed executive vice-president of the Association of Manufacturers of Chilled Car Wheels.

Clifford M. Stoner is a graduate of the University of Minnesota (1924), with a degree of bachelor of science in civil engi-

Clifford M. Stoner

neering. He began his career working on tunnel construction in California and later joined the engineering department of the Elgin, Joliet & Eastern. He was appointed engineer on the staff of the Association of Manufacturers of Chilled Car Wheels in 1934, and in 1937 was placed in charge of engineering, design and statistics. In 1942 he became director of research. During the past several years Mr. Stoner has served on various committees in the wheel industry and is chairman of the committee on wheel design. He has also represented the Wheel Association before several of the committees of the Association of American Railroads and American Railway Engineering Association on matters involving car wheels.

they pool their WHEEL KNOWLEDGE..

..and the ENTIRE INDUSTRY *gains*

These resident inspectors and their assistants have an important job to do. They work for the Association of Manufacturers of Chilled Car Wheels. At regular intervals they hold meetings to keep themselves up to date on inspection practices throughout the country. From their pooled knowledge come benefits not only to the car wheel industry but to the entire railroad field.

As a result of its uninterrupted program of activities — a progressive program marked by ever-advancing standards of testing and checking techniques — AMCCW realizes its original three-fold aim of uniform specifications, uniform inspection, uniform product.

These inspectors come together from posts in individual plants of AMCCW members. Each makes his headquarters with a leading wheel manufacturer — one who has voluntarily agreed to be bound by the Association's rigid code. From a system of uniform reports and constant supervision by a corps of traveling general inspectors, AMCCW personnel succeed in adding a wide, universal viewpoint to the specific jobs of helping highly responsible manufacturers to maintain wheel quality.

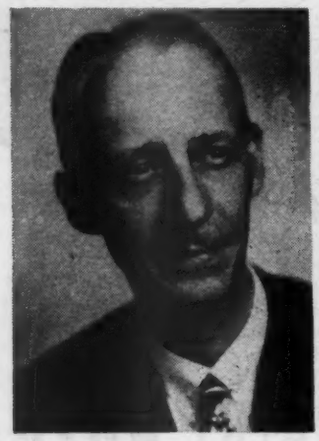
AMCCW

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS

ELECTRO-MOTIVE DIVISION, GENERAL MOTORS CORPORATION. — The Electro-Motive Division of the General Motors Corporation has broken ground at La Grange, Ill., for an engineering and experimental building. All engineering department effort will be combined under one roof in the new building, which will be a one- and two-story structure, 145-ft. by 388-ft., with facilities for experimental locomotive assembly.

Victor E. Rennix, district sales manager of the Electro-Motive division, has been appointed Chicago regional sales manager, with headquarters at Chicago, succeeding *Clyde A. Sattley*, who has retired.

Victor E. Rennix was born at Dublin, Ireland, and is a graduate of the Drexel Institute of Science and Industry at Philadelphia, Pa., and of the University of Pennsylvania. After working in various



Victor E. Rennix

minor capacities with the Baldwin Locomotive Works he became zone sales manager, sales engineer, and in 1937 district sales manager of the New York region. Two years later Mr. Rennix was appointed assistant district manager, with headquarters at Chicago. For one year beginning in 1942 he served with the War Production Board at Washington, D. C., returning to his former position in December, 1943. In February, 1944, Mr. Rennix joined Electro-Motive as district sales manager.

◆

S. KARPEN & BROS.—The transportation seating division of S. Karpen & Bros. has opened a showroom and sales offices at 624 South Michigan avenue, Chicago, to be occupied by the *George B. Cross Company*, exclusive sales agent for Karpen transportation seating. The officers of the company are: George B. Cross, president; B. Williams, vice-president; and R. G. Brooks, treasurer. C. A. VanDerveer, Jr., is the eastern representative.

◆

FAIRBANKS, MORSE & COMPANY.—*C. H. Morse, III*, vice-president in charge of research, patents and the western pump division of Fairbanks, Morse & Co., has been appointed also vice-president in charge of manufacturing plants and operations, succeeding to the duties of *A. E. Ashcraft*, who has retired but will continue as a director of the company. *Henry M. Haase*, assistant manager of the Beloit (Wis.) works of Fairbanks, Morse, has been appointed works manager, succeeding *A. C. Howard*, who has resigned.

◆

WESTINGHOUSE ELECTRIC CORPORATION.—The Westinghouse Electric Corporation has started construction of a new plant, warehouse and office building on an eight-acre site in the geographical center of St. Louis, Mo. The repair section of the plant will be given over to the rejuvenation of Diesel-electric motors and generators for railroads, light traction apparatus and transformers, and the rebuilding of motors for mills and shops.

◆

NATIONAL TUBE COMPANY. — The National Tube Company, a subsiidary of the United States Steel Corporation, has announced an extensive program of improved facilities in the plants at Lorain, Ohio, and Gary, Ind., to enable the company "better to meet the estimated future demands for steel pipe."

John E. Goble, vice-president of National Tube, has been elected president of National, succeeding *Charles R. Cox*, who has become president of Carnegie-Illinois Steel Corporation, another U. S. Steel subsidiary. *William F. McConnor* succeeds Mr. Goble as vice-president in charge of sales of the National Tube Company.

John E. Goble was born at Margaret, Tex., in 1895, and began his business career as a production worker in oil fields near Petrolia, Tex. After serving in the armed forces during World War I, he returned to the Texas oil fields, serving as a driller until 1925, when he joined the Oil Well Supply Company as South American representative, with headquarters at Maracaibo, Venezuela. In 1929 Mr. Goble became assistant manager of the export division, with headquarters at New York; in 1931, manager of that division, and on January 1, 1936, vice-president of National.

William F. McConnor began his career as an apprentice engineer with the York Manufacturing Company, York, Pa., in 1914 following his graduation from Lehigh University's engineering school. He went with the National Transit Company at Oil City, Pa., in 1915, as a draftsman and designer on Diesel oil and gas engines for pipe lines. Two years later he joined National Tube in the Pittsburgh engineering department, where he worked closely on pipe engineering problems. He was named assistant superintendent of construction in building additions to the company's Christy Park Works at McKeesport for increased war production in World War I. After the war, he stayed on at Christy Park as construction engineer, directing the building of new facilities for the manufacture of large diameter welded pipe. In 1920 Mr. McConnor became assistant superintendent of the large pipe department at Christy Park, and from 1923 to 1931 was an assistant to the vice-president, operations, on steel distribution and seamless pipe. He was assistant general manager of sales from 1931 to 1936. Mr. McConnor is a member of the American Iron & Steel Institute and the American Petroleum Institute.

SKF INDUSTRIES, INC.—*T. I. Haley* a*A. C. Barth*, field representatives, respetively, in the Portland, Ore., and Dall Tex., offices, have rejoined SKF af service in the armed forces. Other n field representatives are *J. K. Reddi* Philadelphia, Pa., office; *L. E. Jaco* Buffalo, N. Y.; *W. S. Corneille*, Milwa kee, Wis.; *F. O. Hamlet*, Chicago; *G. Mayhew*, Cleveland, Ohio; *B. J. Frah* Detroit, Mich.; *C. L. Eberlein*, Atla

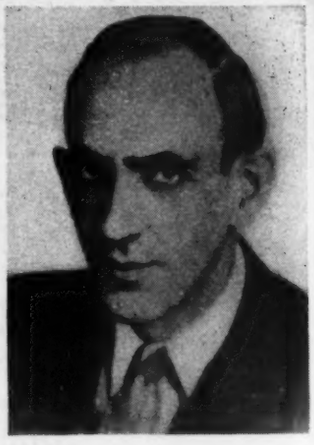
◆

CINCINNATI MILLING AND GRINDING M CHINES, INC.—*John E. Lynch*, for 14 ye manager of the Cincinnati, Ohio, sales fice of Cincinnati Milling and Grinding M chines, Inc., has been appointed mana of the New York office. *Carl M. Bea* has been appointed to manage the Detro Mich., office. *E. F. Render* has been tra ferred from Syracuse, N. Y., to Detro and *W. Kent Mathias* has been transfer from the factory to Syracuse.

◆

A. M. BYERS COMPANY. — *George Coffey* has been appointed manager of t Chicago Division of the A. M. Byers Co pany, with offices in the Conway buildi succeeding *W. A. Taylor*, resigned.

George B. Coffey is a graduate of t University of Indiana (1924). He h



G. M. Coffey

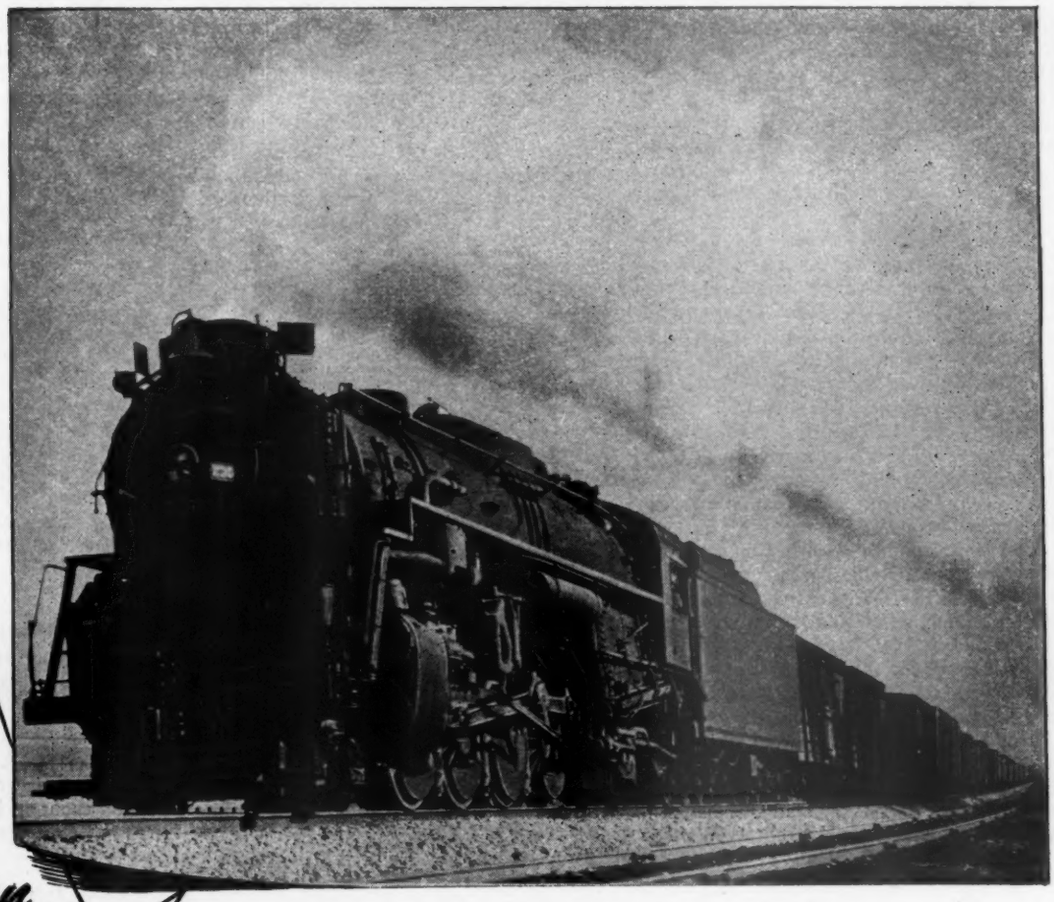
been with the Byers Company since 19 He is president of the Bridge & Buildi Mens Association and a member of t American Society of Heating and Ve tilating Engineers.

◆

BABCOCK & WILCOX TUBE COMPANY.—*Joseph T. Ryerson & Son, Inc.*, a steel di tributor with warehouses in eleven citi has been appointed distributor of B. & W electric resistance welded boiler tubes.

◆

PARKER APPLIANCE COMPANY.—*D. Cameron* has been appointed assistant g eral sales manager of the Parker Applia Company, Cleveland, Ohio. *Harvey Schroeder*, formerly district sales mana in Los Angeles, Calif., has been appoint manager of the newly created Pacific di sion. In his new post, Mr. Schroeder su ceeds *Paul Locklin*, who has resigned manager of the Los Angeles manufactur division which, with the Pacific sales di trict, is being combined into a single We Coast organization. *J. E. Murphy* has be appointed manager of distributor sales.



The Nickel Plate relies on

LIMA 2-8-4's to maintain fast freight schedules

In 1945, agricultural, animal and manufactured products constituted 60% of the thirty-six million tons of freight carried on the Nickel Plate.

Much of this traffic calls for extremely rapid transportation, and to aid in maintaining the necessarily fast schedules for heavy trains, the Nickel Plate employs a fleet of fifty-five modern Lima-built 2-8-4 steam locomotives, placed in service during the last five years.

LIMA LOCOMOTIVE WORKS LIMA LOCOMOTIVE WORKS INCORPORATED **INCORPORATED, LIMA, OHIO**

HEWITT-ROBINS, INC.—The Hewitt Rubber (Buffalo, N. Y.) division of Hewitt-Robins, Inc., has moved its Philadelphia (Pa.) district office and warehouse, from 20 South Fifteenth street to 401 North Broad street, as part of an over-all expansion program. The new location is under the supervision of *C. F. Holden* and *Jack T. Sheldon.*

◆

UNITED STATES RUBBER COMPANY.—United States Rubber Company's Koylon foam seating division has announced the appointment of *J. F. Cordell* as special sales representative for the Chicago area. Mr. Cordell's duties include the sale both of transportation mattresses and seating material to mid-western railroads. Prior to this appointment, Mr. Cordell was with the Army Air Forces as a navigator, with the rank of first lieutenant. Before his war service, he was employed five years by Bendix Products.

The United States Rubber Company has announced the purchase of a government-built plant in Fort Wayne, Ind., for the production of industrial rubber products. The plant, built in 1941 by the Reconstruction Finance Corp. for the Studebaker Aviation Corp., was used during the war for the manufacture of aircraft engine gears.

Fort Wayne will specialize in the manufacture of automobile rubber parts other than tires and tubes. Other products will include rubber-bonded grinding wheels, industrial adhesives, rubber-covered rolls, rubber-lined tanks and pipes, and vibration absorption mountings for radios, railroad cars, street cars, air-conditioning equipment, etc.

Obituary

EDWARD J. GARRIGAN, director and vice-president in charge of sales of the Okonite Company, died at his home in Rutherford, N. J., on July 4. Mr. Garrigan was 62

Edward J. Garrigan

years old. He was closely identified with the electrical industry for 45 years, the latter half with Okonite. He was born in New York and educated in its public schools, later receiving his electrical training at the Pratt Institute. His early career started in the New York Telephone Company's engineering department. He later joined the Western Electric Company as an electrical inspector. He next served as general superintendent of the Waterbury Company's wire and cable mill, subsequently moving to Schenectady, N. Y., as superintendent of the General Electric Company's cable plant there. In 1924 after having been general superintendent of the Habirshaw Electric Cable Corporation, Mr. Garrigan joined Okonite and was appointed factory sales manager, charged particularly with the responsibility of developing a market for the products of Okonite's newly formed affiliate the Okonite-Callender Cable Company, Inc., which was established as a separate unit to make paper-insulated power cables for the utilities. In 1937 he was elected vice-president and sales manager and in 1945 was elected a director and vice-president in charge of sales.

◆

CARLOS DORTICOS of Chicago, retired transportation specialist of the General Electric Company, died July 25, at Portland, Maine.

◆

HAMILTON W. BAKER, president of the American Locker Company, Inc., since its organization in 1931, died on June 14 at his home in Chestnut Hill, Mass.

Personal Mention

General

FRANK E. CHESHIRE, formerly master mechanic of the Missouri Pacific at Osawatomie, Kan., has been appointed chief mechanical officer of the Chicago, Indianapolis & Louisville, with headquarters at

Frank E. Cheshire

Lafayette, Ind. Mr. Cheshire was born at Cumberland, Md., on April 27, 1898. He received his higher education at the Potomac State College, Keyser, W. Va., and the Davis-Elkins College, Elkins, W. Va., and entered railway service in 1915 as a special apprentice in the employ of the Baltimore & Ohio at Keyser. He subsequently served as work inspector and assistant foreman at Keyser, and repair accountant, shop foreman and general foreman at various points on the road. In July, 1926, he went with the Missouri Pacific as assistant general inspector in the mechanical department, with headquarters at St. Louis, Mo. In 1927, he was appointed general inspector, and in March, 1940, assistant superintendent of the car department. In February, 1942, Mr. Cheshire was furloughed to serve with the armed forces. He returned to the Missouri Pacific in June, 1945, and was appointed master mechanic of the Central Kansas and Colorado division. According to J. W. Barriger, president of the Monon, Mr. Cheshire, as chief mechanical officer, will have primary responsibility for specifying the kind and amount of mechanical equipment required in the extensive modernization program contemplated by this railroad, which includes complete Dieselization of Monon service, both passenger and freight.

◆

N. R. Ross, mechanical engineer of the Great Northern at St. Paul, Minn., has retired because of ill health.

◆

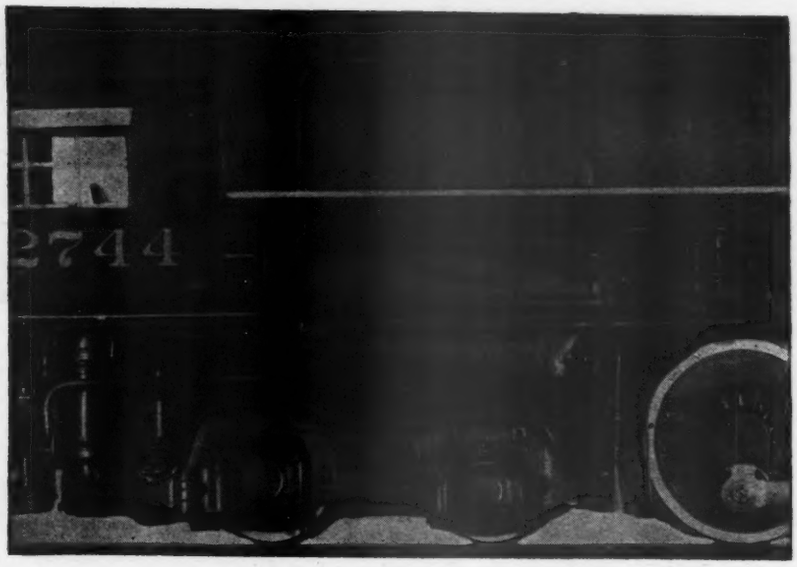
W. A. SLATER has been appointed mechanical inspector, Atlantic Region, of the Canadian National, with headquarters at Moncton, N. B.

F. R. DENNEY, mechanical engineer of the Texas & Pacific at Dallas, Tex., has been appointed assistant mechanical superintendent, with headquarters at Dallas. Mr.

F. R. Denney

Denney was born at Fortsville, Ind., on April 20, 1902, and is a graduate of Purdue university. He entered railway service in 1924 as an apprentice in the employ of the Cleveland, Cincinnati, Chicago & St. Louis. He subsequently served in supervisory capacities until 1930, when he resigned to serve as service engineer of the Super-

1/5 MORE POWER



FOR 40 ADDITIONAL C & O LOCOMOTIVES

ALL 40 of the recently ordered 2-8-4's for the Chesapeake & Ohio will be equipped with Boosters*. Initial drawbar pull for these 460,000-lb freight locomotives will be almost exactly one-fifth greater because of this supplementary power unit.

The Chesapeake & Ohio is thoroughly familiar with performance of Booster-equipped locomotives — it has equipped more than 200 locomotives with Boosters during the last 22 years and all 50 of its previously ordered 2-8-4's are Booster-equipped.

Greater drawbar pull at speeds up to 25 and 30 mph is of definite advantage — in both freight and passenger service. Investigate the possibility of equipping new *or* existing locomotives with the Franklin Locomotive Booster. Full engineering information is available on request.

**Trade Mark Reg. U.S. Pat. Off.*

FRANKLIN RAILWAY SUPPLY COMPANY, INC.

NEW YORK • CHICAGO • MONTREAL

STEAM DISTRIBUTION SYSTEM • BOOSTER • RADIAL BUFFER • COMPENSATOR AND SNUBBER • POWER REVERSE GEARS
AUTOMATIC FIRE DOORS • DRIVING BOX LUBRICATORS • STEAM GRATE SHAKERS • FLEXIBLE JOINTS • CAR CONNECTION

BEATTY *Engineering*

puts that *Plus* in BEATTY machines

Back of the solid, money-making performance of every BEATTY Machine stands the sound, seasoned judgement of a BEATTY engineer. This broad engineering experience represents an important bonus in every machine that bears the BEATTY name.

BEATTY MACHINE AND MFG. COMPANY
HAMMOND, INDIANA

507 (Adv. 72)

heater Company. On May 29, 1933, Mr. Denney became a machinist in the employ of the T. & P. He then served successively as foreman, chief draftsman, mechanical inspector, assistant master mechanic, master mechanic and mechanical engineer.

C. E. MILLER has been appointed superintendent, air-brake equipment and steam heat, of the New York Central System, with headquarters at New York.

W. H. ELSNER, chief draftsman of the Great Northern at St. Paul, Minn., has been appointed mechanical engineer, with headquarters at St. Paul.

FRANCIS B. LEWIS, mechanical engineer of the Union Pacific, has been appointed general safety agent, with headquarters as before at Omaha, Neb.

H. G. WOODSON has been appointed office assistant to the general mechanical superintendent of the New York, New Haven & Hartford, with headquarters at New Haven, Conn.

H. D. HOLLIS, chief draftsman of the Texas & Pacific at Dallas, Tex., has been appointed mechanical engineer, with headquarters at Dallas.

Master Mechanics and Road Foremen

DAVID HINTON RICHMOND, who has been appointed master mechanic of the Chesapeake & Ohio at Peru, Ind., as announced in the July issue, was born on December 27, 1897, at Milton, N. C. He attended high school from 1920 to 1922 and had three years of mechanical engineering at the West Virginia University (1922 to 1925).

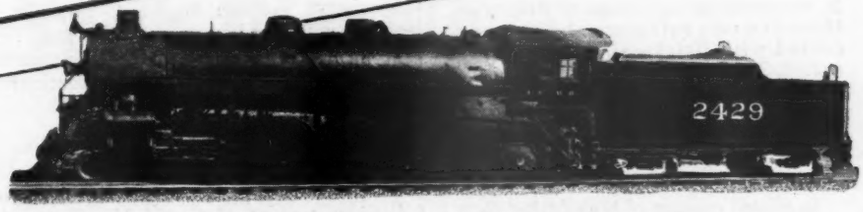
D. H. Richmond

From 1914 to 1918 served as a machinist apprentice in the employ of the American Locomotive Company at Paterson, N. J. He then served as a machinist with the Covington Machine Company, Covington, Va.; as a machinist at the Washington Navy Yard, and as a machinist for the Newport News Shipbuilding and Drydock Company. In 1919 he returned to the American Locomotive Company as assistant machine shop foreman at Pittsburgh, Pa., and in 1920 was transferred to Richmond, Va., as machine shop foreman. He entered the employ of the C. & O. in October, 1926, as a machinist. In 1927 he became a ma-

Twelfth Anniversary

of first installation of

SECURITY CIRCULATORS



TWELVE years ago the first installation of Security Circulators was made on a locomotive of the Illinois Central, No. 2429 being equipped with four circulators.

Since that time, every year has seen a continually widening recognition of the many advantages of Security Circulators for improving locomotive performance. Today, more than 6600 Security Circulators have been ordered by forty-five different railroads.

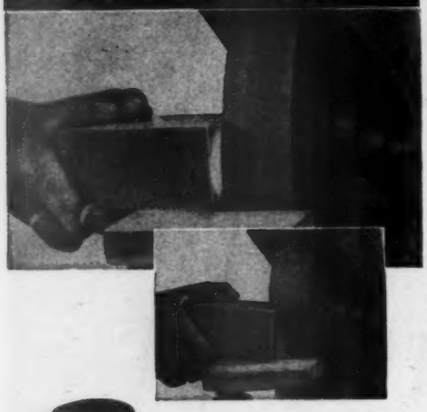
AMERICAN ARCH COMPANY, INC.

NEW YORK • CHICAGO

SECURITY CIRCULATOR DIVISION

BRICKSEAL

REFRACTORY COATING



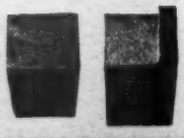
Resists

ABRASION

PROTECTION against abrasion is an outstanding advantage of Brickseal. Here are two refractory bricks, one coated with Brickseal, the other uncoated. They were heated to more than 2000°, taken directly from the furnace, cooled and shoved against an emery wheel. Hot and cold, the Brickseal-treated brick resisted the abrasion – see below.

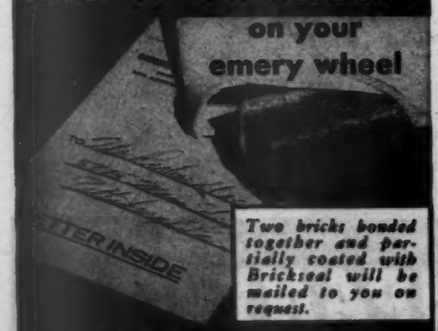
Brickseal consists of high fusion clays and metal oxides combined in oil. Furnace heat burns away the oils and vitrifies the clays and metals which penetrate deeply into the pores, cracks and joints. Brickseal prevents cracking, spalling and slagging regardless of sudden temperature changes. Brickseal is also a mortar for laying up refractory walls.

Compare the Brickseal-treated brick at the left to the untreated at the right.



TRY IT YOURSELF

on your emery wheel



Two bricks bonded together and partially coated with Brickseal will be mailed to you on request.

BRICKSEAL

REFRACTORY COATING

5800 So. Hoover St., Los Angeles, Calif.

1029 Clinton St., Hoboken, New Jersey

chinist at Russell, Ky.; in 1928 night enginehouse foreman at Ashland, in 1929 chief inspector at the Huntington, W. Va., shops; in 1931 inspector of standards; in 1933 inspector of service tests, in 1938 mechanical inspector (system), and on June 6, 1946, master mechanic of the Chicago division.

O. L. HOPE has been appointed master mechanic of the Missouri Pacific with headquarters at Osawatomie, Kan.

J. M. WHALEN, master mechanic of the Missouri Pacific at St. Louis, has retired.

U. F. TIHEN, general foreman, locomotive department, of the Missouri Pacific at St. Louis, Mo., has been appointed master mechanic, with headquarters at St. Louis.

E. R. HANNA, master mechanic of the Missouri Pacific at Nevada, Mo., who has been granted a leave of absence due to illness.

J. WALKER has been appointed acting master mechanic of the Missouri Pacific, with headquarters at Nevada, Mo.

G. LUSHBAUGH, general foreman of the Chesapeake & Ohio at Clifton Forge, Va., has been appointed master mechanic at Stevens, Ky.

C. D. ALLEN, master mechanic of the Cincinnati division of the Chesapeake & Ohio, with headquarters at Stevens, Ky., has been transferred to the Huntington division with headquarters at Huntington, W. Va.

G. E. BELL, assistant master mechanic of the Illinois Central at Hazel Crest, Ill., has been appointed master mechanic, with headquarters at McComb, Miss., succeeding A. D. Haley, who has been assigned to other duties because of ill health.

GREGOR GRANT, division master mechanic of the Canadian Pacific at Winnipeg, Man., has been appointed division master mechanic, with headquarters at Nelson, B. C.

ARTHUR BAYNHAM, locomotive foreman of the Canadian Pacific at Winnipeg, Man., has been appointed division master mechanic, with headquarters at Winnipeg.

Shop and Enginehouse

J. N. MARTIN, superintendent of locomotive shops of the New York Central, at Beech Grove, Ind., has retired.

PETER BARON, division master mechanic of the Canadian Pacific at Nelson, B. C., has been appointed works manager of the Ogden shops at Calgary, Alta.

B. L. THOMPSON, night superintendent at the Point St. Charles shops of the Canadian National, has been appointed superintendent of the Fort Rouge shops, Winnipeg, Man.

Car Department

S. G. PETERSON, general foreman, car department, of the Seaboard Air Line at Portsmouth, Va., has been appointed superintendent car department, with headquarters at Norfolk, Va. Mr. Peterson was born on September 10, 1900, at Perth Amboy, N. J. He attended Cooper Union School of Engineering for one year and entered railroad service in October, 1920, as a draftsman for the New York Central. He transferred his services to the Seaboard,

Steven G. Peterson

also as a draftsman, in April, 1925, and in May, 1932, became shop engineer at Norfolk. Mr. Peterson was appointed assistant master car builder for the system in December, 1940; and general foreman of the Portsmouth (Va.) shops in July, 1944.

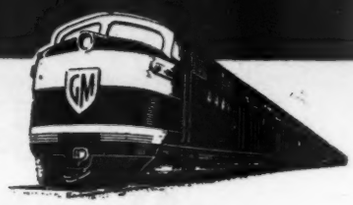
THOMAS B. DAVIS, whose appointment as master car builder of the Western Maryland, with headquarters at Hagerstown, Md., was announced in the July issue, was born on September 28, 1904, at Baltimore,

Thomas B. Davis

Md. He entered railroading in 1922 as a clerk in the maintenance of equipment department of the Western Maryland. He became a carman apprentice, and on completion of apprenticeship worked in various capacities until he was appointed car foreman at the Baltimore terminal in August, 1937. Mr. Davis became traveling general car foreman in April, 1943, with headquarters at Hagerstown, and master car builder on May 16, 1946.

Obituary

FRANK J. TOPPING, master mechanic of the Chesapeake & Ohio at Huntington, W. Va., died on July 4. A sketch and photograph of Mr. Topping appeared on page 386 of the July issue following his appointment to the position of master mechanic at Huntington.



Our Interest Does Not End With The Delivery of Your Diesels

YOUR General Motors Diesel locomotives are built to run at peak performance at all times. But, being mechanical, they must be efficiently maintained and operated to assure that high degree of performance.

Our Instruction Car is a familiar sight on customer-railroads the country over. It has given instruction to all classes of railroad personnel. Lower operating costs and higher efficiency have been the result.

The Electro-Motive Diesel Locomotive School at La Grange serves much the same purpose in training the supervisory maintenance and operating personnel of customer-railroads.

Spacious, well-equipped classrooms are provided. Modern teaching aids make the course interesting as well as instructive. Motion pictures, slide films, charts and cut-away equipment are used extensively. Near by in the plant, locomotives in all states of construction are available for observation.

With the additional instructors and classroom facilities now available in the new Service Building, the school is in a better position than ever to serve our railroad customers.

For full details, including a quick day-by-day look at the course, a brief, illustrated booklet is available to any railroad man serving in executive or supervisory capacity. Write to D. H. Queeney, Service Manager, Electro-Motive Division, General Motors, La Grange, Illinois.

This is only one of the plus values that goes with the purchase of General Motors Diesel locomotives.

GM LOCOMOTIVES

ELECTRO-MOTIVE DIVISION

THOMAS STRAIGHT SIDE PRESSES

FORMING - DRAWING
BLANKING
PIERCING

can be done with these up-to-the minute presses. They combine modern structural design with the usual Thomas inbuilt ruggedness and dependability. Wide range of sizes and capacities. *Write for Bulletin 307.*

THOMAS
MACHINE MANUFACTURING COMPANY
PITTSBURGH 33, PA.

7

REBUILT CARS PAY DIVIDENDS

The sides of this dump bottom gondola, were increased to 7' height for coke service.

If you require standard or special type cars, we offer

"PROMPT DELIVERY". Flat, gondola, box, tank and passenger cars are available for rebuilding to meet your requirements.

DEPENDABLE SERVICE— Competent engineering, well equipped shops and experienced personnel mean long service life in our rebuilt cars.

SHOPS LOCATED AT

PUEBLO, COLORADO — CHICAGO, ILLINOIS

CHICAGO FREIGHT CAR & PARTS CO.

228 North La Salle Street — Chicago 1, Illinois

Trade Publications

Copies of trade publications described in the column can be obtained by writing to the manufacturers, preferably on company letterhead, giving title. State the name and number of the bulletin or catalog desired, when it is mentioned.

SPLIT BALL BEARING.—Split Ballbearing Corporation, Lebanon, N. H. Thirty-page catalogue No. 84 gives specifications on sizes, load ratings, etc., on a complete line of divisible race ball, roller and thrust bearings. Illustrates actual operation.

◆

CAMOGRAPHS.—Air reduction, 60 East Forty-Second street, New York 17. Two-page illustrated bulletin describing Airco No. 4 and No. 5 Camographs for machine gas cutting of straight lines and irregular shapes from templates.

◆

SPRAY EQUIPMENT.—Eclipse Air Brush Co., 427 Park avenue, Newark 7, N. J., forty-four-page catalogue 86, in three colors, describes the complete line of Eclipse low-pressure spray equipment. Presents a series of simple tests by which any spray equipment user can easily judge the value of low-pressure spray equipment, followed by information on all Eclipse equipment now available. Application photographs supplement the product detail.

◆

WELDMENTS.—Lukenweld, Inc., 279 Lukens building, Coatesville, Pa. "Weldments Designed and Fabricated by Lukenweld," a 26-page booklet printed in color, illustrates typical Lukenweld products, machining and finishing operations, and inspection and testing facilities.

◆

GOODRICH BOOKLETS.—B. F. Goodrich Company, Akron, Ohio. *"Industrial Rubber Products,"* a 28-page pocket-size booklet lists the Goodrich line of flat transmission and conveyor belting, fractional horsepower V-belts and sheaves, hose and hose couplings, packing, hard and sponge rubber, etc. *"You've Got Something There,"* a 22-page booklet discusses the need for suggestions to better operations and the benefits derived from such suggestions. Cartoon sketches illustrate points discussed.

◆

BOILER WASHING.—National Aluminate Corporation, Paige-Jones Chemical Co., 6226 West Sixty-sixth Place, Chicago 38. Bulletin No. 461, entitled "Boiler Repairs Zero in Five Years!" discusses the results obtained on eight Duluth, Missabe & Iron Range articulated locomotives through the use of the circulating cool-down system of boiler washing and the Nalco water treatment.

Miscellaneous Publications

"CORROSION CONTROL IN AIR CONDITIONING."—Mutual Chemical Company of America, 270 Madison avenue, New York 16. A 16-page booklet, Serial No. 35, entitled "Corrosion Control in Air Conditioning; The Chromate Treatment of Their Water Systems," explains how to employ chromate to the best advantage in various central systems of unit air conditioners. Data show chromate consumption and the effects of chloride concentration.